

TRİQONOMETRİK FUNKSİYALAR

1. 80° -li bucağı radianla ifadə edin.

- A) $\pi/8$ B) $\pi/12$ C) $4\pi/9$ D) $9\pi/4$ E) $2\pi/3$

$$80^\circ = 80 \cdot \frac{\pi}{180} = \frac{4\pi}{9}$$

$$\alpha^\circ = \alpha \cdot \frac{\pi}{180} \text{ radian}$$

2. Aşağıdakı ifadələrin hansı mənfidir:

I. $(-3)^{101} \cdot \cos \frac{6\pi}{5} \cdot \sin \frac{\pi}{4} = +$ II. $[(-3)^{101} - \sin \frac{\pi}{4}] \cdot \cos \frac{6\pi}{5} = +$

III. $\frac{\cos \frac{6\pi}{5} - \sin \frac{\pi}{4}}{(-3)^{101}} = +$ IV. $(-3)^{101} + \cos \frac{6\pi}{5} - \sin \frac{\pi}{4} = -$

V. $\frac{(-3)^{101} - \sin \frac{\pi}{4}}{\cos \frac{6\pi}{5}} = +$

- A) I B) II C) III D) IV E) V

$$(-3)^{101} = -3^{100} < 0$$

$$\frac{6\pi}{5} = \frac{6 \cdot 180^\circ}{5} = 216^\circ \in \text{II} \text{ ucb}$$

$$\cos \frac{6\pi}{5} = \cos 216^\circ < 0$$

$$\frac{\pi}{4} = \frac{180^\circ}{4} = 45^\circ \in \text{I} \text{ ucb}$$

$$\sin \frac{\pi}{4} = \sin 45^\circ > 0$$

3. $a = \sin 20^\circ$, $b = \cos 75^\circ$, $c = \tan 200^\circ$ ədədlərini müqayisə edin və doğru bərabərsizliyi göstərin.

- A) $a > b > c$ B) $b > a > c$ C) $c > a > b$
D) $c > b > a$ E) $a > c > b$

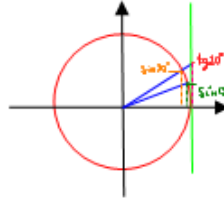
$$a = \sin 20^\circ$$

$$b = \cos 75^\circ = \cos(90^\circ - 15^\circ) = \sin 15^\circ$$

$$c = \tan 200^\circ = \tan(180^\circ + 20^\circ) = \tan 20^\circ$$

$$\sin 15^\circ < \sin 20^\circ < \tan 20^\circ$$

$$b < a < c \text{ ya } c > a > b$$



4. Aşağıdakı ifadələrin hansı müsbətdir:

I. $(-2)^{99} \cdot \cos 120^\circ \cdot \sin 230^\circ = +$ II. $[(-9)^{99} - \sin 120^\circ] \cdot \cos 60^\circ = -$

III. $\frac{\cos 230^\circ + \sin 240^\circ}{(-2)^{99}} = +$ IV. $(-2)^{99} + \cos 240^\circ - \sin 230^\circ = -$

V. $\frac{(-2)^{99} - \sin 240^\circ}{\cos 20^\circ} = +$

- A) I B) V C) IV D) II E) III

5. $f(x) = \begin{cases} 1, & \text{əgər } x \in Q \\ -1, & \text{əgər } x \in J \end{cases}$ funksiyası verilmişdir, burada Q və J uyğun olaraq rasional və irrasional ədədlər çoxluğudur.

$f(\cos 300^\circ) - f(\sin 120^\circ)$ ifadəsinin qiymətini hesablayın.

- A) 0 B) 1 C) 2 D) -1 E) -2

$$\cos 300^\circ = \cos(360^\circ - 60^\circ) = \cos 60^\circ = \frac{1}{2} \in Q$$

$$\sin 120^\circ = \sin(180^\circ - 60^\circ) = \sin 60^\circ = \frac{\sqrt{3}}{2} \in J$$

$$f(\cos 300^\circ) - f(\sin 120^\circ) = f(\frac{1}{2}) - f(\frac{\sqrt{3}}{2}) = 1 - (-1) = 1 + 1 = 2$$

6. Funksiyanın ən kiçik müsbət dövrünü tapın:

$$y = \sin \frac{2\pi}{3}x + \tan \frac{\pi}{3}x$$

- A) 2π B) 24 C) 24π D) 8 E) 6π

$$f(x) = u(x) + v(x)$$

$$\left. \begin{aligned} u(x + T_1) &= u(x) \\ v(x + T_2) &= v(x) \end{aligned} \right\} f(x + 2\pi \text{KOB}(T_1, T_2)) = f(x)$$

$$\text{və } u(x) = u(x + T_1) \Rightarrow u(x) = u(x + \frac{2\pi}{3})$$

CFR $\sin \frac{2\pi}{3}x$ -in dövrü $2x \cdot \frac{2\pi}{3} = 2x \cdot \frac{2\pi}{3} = 3 = T_1$
 $\tan \frac{\pi}{3}x$ -in dövrü $x \cdot \frac{\pi}{3} = x \cdot \frac{\pi}{3} = 3 = T_2$ $2\pi \text{KOB}(T_1, T_2) = 2\pi \text{KOB}(3, 3) = 24$

7. $\text{ctg} \alpha = -2$ və $\frac{3\pi}{2} < \alpha < 2\pi$ olarsa, $\sin \alpha$ -ni tapın.

- A) $-\sqrt{\frac{1}{5}}$ B) $\sqrt{\frac{1}{5}}$ C) $\sqrt{\frac{1}{3}}$ D) $-\sqrt{\frac{1}{3}}$ E) $\frac{1}{3}$

$$\alpha \in \text{IV-ücb. } \sin \alpha < 0. \quad 1 + \text{ctg}^2 \alpha = \frac{1}{\sin^2 \alpha} \Rightarrow \sin^2 \alpha = \frac{1}{1 + \text{ctg}^2 \alpha} \Rightarrow$$

$$\Rightarrow \sin \alpha = \pm \sqrt{\frac{1}{1 + \text{ctg}^2 \alpha}} \quad \sin \alpha = -\sqrt{\frac{1}{1 + (-2)^2}} = -\sqrt{\frac{1}{5}}$$

8. $\cos \alpha = -0,6$ və $\pi < \alpha < \frac{3\pi}{2}$ olduqda, $\sin \alpha$ -ni tapın.

- A) 0,8 B) 0,9 C) -0,9 D) -0,8 E) 0,4

$$\alpha \in \text{III} \quad \sin \alpha < 0. \quad \cos^2 \alpha + \sin^2 \alpha = 1$$

$$\sin^2 \alpha = 1 - \cos^2 \alpha$$

$$\sin \alpha = \pm \sqrt{1 - \cos^2 \alpha}$$

$$\sin \alpha = -\sqrt{1 - (-0,6)^2} = -\sqrt{1 - 0,36} = -\sqrt{0,64} = -0,8$$

9. $y = \cos^2 x - \sin^2 x$ funksiyanın ən kiçik müsbət dövrünü tapın:

- A) π B) 2 C) $\frac{\pi}{2}$ D) 4 E) $\frac{\pi}{3}$

$$y = \cos 2x \quad T = \frac{2\pi}{2} = \pi$$

10. $\text{ctg} \alpha = 2$ olarsa, $\tan \alpha$ -ni tapın.

- A) 2 B) 4 C) -2 D) $-\frac{1}{2}$ E) $\frac{1}{2}$

$$\text{ctg} \alpha \cdot \tan \alpha = 1 \quad \tan \alpha = \frac{1}{\text{ctg} \alpha} = \frac{1}{2} = \frac{1}{2}$$

11. Radian ölçüsü $\frac{\pi}{5}$ olan olan bucağın dərəcə ölçüsünü tapın.

- A) 36° B) 72° C) 18° D) 45° E) 15°

$$1 \text{ radian} = 180^\circ \quad \frac{\pi}{5} = \frac{180^\circ}{5} = 36^\circ$$

12. $\sin \alpha + \cos \alpha = \sqrt{2}$ olarsa, $\sin \alpha \cdot \cos \alpha$ hasilini tapın.

- A) 1 B) $\sqrt{2}$ C) 0,25 D) 0,2 E) 0,5

$$(\sin \alpha + \cos \alpha)^2 = \sqrt{2}^2$$

$$\sin^2 \alpha + 2 \sin \alpha \cos \alpha + \cos^2 \alpha = 2$$

$$1 + 2 \sin \alpha \cos \alpha = 2$$

$$2 \sin \alpha \cos \alpha = 1$$

$$\sin \alpha \cos \alpha = \frac{1}{2} = 0,5$$

13. $\cos 120^\circ$ -ni tapın.

- A) $-\frac{1}{2}$ B) $\frac{1}{2}$ C) $-\frac{\sqrt{2}}{2}$ D) $-\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{3}}{2}$

$$\cos 120^\circ = \cos(180^\circ - 60^\circ) = -\cos 60^\circ = -\frac{1}{2}$$

14. $y = 1 - 2 \cos^2 x$ funksiyanın ən kiçik müsbət dövrünü tapın

- A) π B) 2π C) $\frac{\pi}{2}$ D) 4π E) $4\pi^2$

$$y = 1 - 2 \cos^2 x = 1 - 2 \cdot \frac{1 + \cos 2x}{2} = 1 - (1 + \cos 2x) = 1 - 1 - \cos 2x = -\cos 2x$$

$$y = -\cos 2x$$

$$T = \frac{2\pi}{2} = \pi$$

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$$5 \sin^2 \alpha + 3(1 - \sin^2 \alpha) = 5 \sin^2 \alpha + 3 - 3 \sin^2 \alpha = 2 \sin^2 \alpha + 3$$

$$2 \sin^2 \alpha + 3 = 6 \quad 2 \sin^2 \alpha = 3 \quad \sin^2 \alpha = \frac{3}{2} \quad \sin \alpha = \sqrt{\frac{3}{2}} \quad \alpha \in [3; 5]$$

15. $\sin 120^\circ$ -ni tapın.

- A) $\frac{\sqrt{2}}{2}$ B) $\frac{1}{2}$ C) 1 D) $\frac{\sqrt{3}}{2}$ E) $\frac{2}{\sqrt{3}}$

$$\sin 120^\circ = \sin(180^\circ - 60^\circ) = \sin 60^\circ = \frac{\sqrt{3}}{2}$$

16. $\frac{11\pi}{20}$ radianlıq bucağın qonşu bucağı neçə dərəcədir?

- A) 99° B) 108° C) 63° D) 72° E) 81°

$$x = 180^\circ - \frac{11\pi}{20} = \frac{360^\circ - 11 \cdot 18^\circ}{20} = \frac{9 \cdot 180^\circ}{20} = \frac{9 \cdot 180^\circ}{20} = 81^\circ$$

17. 130° dərəcəli bucağın qonşu bucağı neçə radiandır?

- A) $\frac{5\pi}{18}$ B) $\frac{13\pi}{18}$ C) $\frac{7\pi}{18}$ D) $\frac{5\pi}{9}$ E) $\frac{13\pi}{9}$

$$\alpha = 180^\circ - 130^\circ = 50^\circ \approx 50 \cdot \frac{\pi}{180} = \frac{5\pi}{18}$$

18. Üçbucağın iki bucağının cəminin kosinusu $\frac{\sqrt{3}}{8}$ -dir. Onun üçüncü bucağının kosinusunu tapın.

- A) $-\frac{\sqrt{3}}{8}$ B) $\frac{\sqrt{3}}{8}$ C) $\frac{\sqrt{55}}{8}$ D) $-\frac{\sqrt{55}}{8}$ E) $\frac{3}{8}$

$$\alpha + \beta + \gamma = 180^\circ \quad \alpha = 180^\circ - (\beta + \gamma)$$

$$\cos(\beta + \gamma) = \frac{\sqrt{3}}{8} \quad \cos \alpha = \cos(180^\circ - (\beta + \gamma)) = -\cos(\beta + \gamma) = -\frac{\sqrt{3}}{8}$$

19. $f(x) = x^2$; $g(x) = \sin x$ isə $f(g(x))$ -i tapın.

- A) $\sin x^2$ B) $\sin^2 x$ C) $\sin^2 x^2$ D) $x^2 \sin x$ E) $x^2 \cdot \sin^2 x$

$$f(g(x)) = (\sin x)^2 = \sin^2 x$$

$f(x)$ -də x -in yerinə $g(x)$ -i yəni $\sin x$ -i yazırıq.

20. $f(x) = \frac{x}{2}$; $g(x) = \cos x + 1$ olduğunu bilərək, $g(f(x))$ -i tapın.

- A) $\frac{3}{2}$ B) 1 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) $-\frac{3}{2}$

$$g(f(x)) = \cos \frac{x}{2} + 1 = \frac{1}{2} + 1 = \frac{3}{2}$$

$$tg \alpha = \frac{\sin \alpha}{\cos \alpha} \text{ olduğundan}$$

21. $tg \alpha = -5$ olduğunu bilərək, $\frac{2 \sin \alpha + \cos \alpha}{\cos \alpha - 2 \sin \alpha}$ ifadəsinin qiymətini tapın.

- A) $-\frac{10}{11}$ B) $-\frac{9}{11}$ C) $-\frac{5}{9}$ D) 1 E) -1

$\cos \alpha$ -nin sürət və məxrəcəndəki həddlərin hər birini $\cos \alpha - 2$ bölək

$$\frac{\frac{2 \sin \alpha + \cos \alpha}{\cos \alpha} + \frac{\cos \alpha}{\cos \alpha}}{\frac{\cos \alpha}{\cos \alpha} - \frac{2 \sin \alpha + \cos \alpha}{\cos \alpha}} = \frac{2 + tg \alpha + 1}{1 - 2tg \alpha} = \frac{2(-5) + 1}{1 - 2(-5)} = \frac{-10 + 1}{1 + 10} = \frac{-9}{11}$$

22. $ctg \alpha = -4$ olduqda $\frac{3 \sin \alpha - \cos \alpha}{2 \cos \alpha - \sin \alpha}$ ifadəsinin qiymətini tapın.

- A) $-\frac{7}{9}$ B) 1 C) -1 D) $\frac{6}{7}$ E) $-\frac{6}{7}$

$$ctg \alpha = \frac{\cos \alpha}{\sin \alpha} = -4 \Rightarrow \frac{3 \sin \alpha - \cos \alpha}{2 \cos \alpha - \sin \alpha} = \frac{3 \frac{\cos \alpha}{-4} - \cos \alpha}{2 \cos \alpha - \frac{\cos \alpha}{-4}} = \frac{3 - ctg \alpha}{2ctg \alpha - 1} = \frac{3 - (-4)}{2(-4) - 1} = \frac{3 + 4}{-8 - 1} = \frac{7}{-9} = -\frac{7}{9}$$

23. $f(x) = 5 \sin^2 x + 3 \cos^2 x$ funksiyasının qiymətlər oblastını tapın.

- A) [0; 8] B) [3; 8] C) [0; 5] D) [3; 5] E) [5; 8]

$$f(x) = 5 \cdot \frac{1 - \cos 2x}{2} + 3 \cdot \frac{1 + \cos 2x}{2} = \frac{5 - 5 \cos 2x + 3 + 3 \cos 2x}{2} = \frac{8 - 2 \cos 2x}{2} = 4 - \cos 2x$$

$$-1 \leq \cos 2x \leq 1 \Rightarrow 4 - 1 = 3 \leq f(x) \leq 4 + 1 = 5 \quad [3; 5]$$

24. $f(x) = 3 \sin^2 x + 7 \cos^2 x$ funksiyasının qiymətlər oblastını tapın.

- A) [3; 7] B) [0; 3] C) [0; 7] D) [0; 10] E) [3; 10]

$$f(x) = 3 \sin^2 x + 7(1 - \sin^2 x) = 3 \sin^2 x + 7 - 7 \sin^2 x = 7 - 4 \sin^2 x$$

$$f(x) = 7 - 4 \sin^2 x \quad 0 \leq \sin^2 x \leq 1$$

$$7 - 4 \cdot 0 = 7 \quad 7 - 4 \cdot 1 = 3 \quad [3; 7]$$

25. Sadələşdirin: $\sin^4 \alpha + \sin^2 \alpha \cos^2 \alpha + \cos^2 \alpha$.

- A) $1 + \sin^2 \alpha$ B) $1 + \cos^2 \alpha$ C) 3 D) 1 E) $\sin^4 \alpha + 1$

$$\sin^4 \alpha + \sin^2 \alpha \cos^2 \alpha + \cos^2 \alpha = \sin^2 \alpha (\sin^2 \alpha + \cos^2 \alpha) + \cos^2 \alpha = \sin^2 \alpha \cdot 1 + \cos^2 \alpha = \sin^2 \alpha + \cos^2 \alpha = 1$$

26. Sadələşdirin: $(1 - \cos^2 \alpha)(1 + tg^2 \alpha)$.

- A) $\sin^2 \alpha$ B) $\cos^2 \alpha$ C) $tg^2 \alpha$ D) $ctg^2 \alpha$ E) $2ctg \alpha$

$$(1 - \cos^2 \alpha)(1 + tg^2 \alpha) = \sin^2 \alpha \cdot \frac{1}{\cos^2 \alpha} = \frac{\sin^2 \alpha}{\cos^2 \alpha} = \left(\frac{\sin \alpha}{\cos \alpha}\right)^2 = tg^2 \alpha$$

27. $\sin 240^\circ = a$ olarsa, $\cos 240^\circ$ -ni tapın.

- A) $2a$ B) $2a\sqrt{1 - a^2}$ C) $-2a\sqrt{1 - a^2}$

- D) $\sqrt{1 - a^2}$ E) $-\sqrt{1 - a^2}$

$$240^\circ \in III \text{ və } IV \quad \cos 240^\circ = -\sqrt{1 - \sin^2 240^\circ} = -\sqrt{1 - a^2}$$

28. $\cos 280^\circ = a$ olarsa, $\sin 280^\circ$ -ni tapın.

- A) $\sqrt{1 - a^2}$ B) $2a$ C) $1 - a$ D) $\sqrt{a^2 - 1}$ E) $-\sqrt{1 - a^2}$

$$280^\circ \in IV \text{ və } III \quad \sin 280^\circ = -\sqrt{1 - \cos^2 280^\circ} = -\sqrt{1 - a^2}$$

29. a ədədinin hansı qiymətlərində $\cos x = a - 1$ bərabərliyi

$x \in \left[\pi; \frac{3\pi}{2}\right]$ olduqda doğrudur?

- A) [-1; 1] B) [-1; 0] C) [0; 1] D) [-2; 0] E) [0; 2]

$$-1 \leq \cos x \leq -1$$

$$-1 \leq a - 1 \leq -1$$

$$-1 + 1 \leq a \leq -1 + 1$$

$$0 \leq a \leq 0$$

$$[0; 0]$$

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30. b ədədinin hansı qiymətlərində $\sin x = 0,5 + b$ bərabərliyi

$x \in \left[\frac{\pi}{2}; 2\pi\right]$ olduqda doğrudur?

- A) $[-1; 1]$ B) $[0,5; 1]$ C) $[-1; 0]$
 D) $[-1,5; 0,5]$ E) $[-1,5; -0,5]$

$$\begin{aligned} -1 &\leq \sin x \leq 1 \\ -1 &\leq 0,5 + b \leq 1 \\ -1 - 0,5 &\leq b \leq 1 - 0,5 \quad [-1,5; 0,5] \\ -1,5 &\leq b \leq 0,5 \end{aligned}$$

31. $\sin 25^\circ = a$ olduqda, $\cos 245^\circ$ -ni tapın

- A) a B) $-a$ C) $\sqrt{1-a^2}$ D) $-\sqrt{1-a^2}$ E) 0,25

$$\begin{aligned} 245^\circ + 25^\circ &= 270^\circ \\ 245^\circ &= 270^\circ - 25^\circ \\ \cos 245^\circ &= \cos(270^\circ - 25^\circ) = -\sin 25^\circ = -a \\ \cos 25^\circ &= -a \end{aligned}$$

32. $\operatorname{tg} 35^\circ = a$ olduqda, $\operatorname{ctg} 125^\circ$ -ni tapın.

- A) a B) $-a$ C) $\frac{1}{a}$ D) $a^2 + 1$ E) $a^2 - 1$

$$\begin{aligned} 125 - 35 &= 90 \\ 125 &= 90 + 35 \\ \operatorname{ctg} 125^\circ &= \operatorname{ctg}(90^\circ + 35^\circ) = -\operatorname{tg} 35^\circ = -a \\ \operatorname{ctg} 125^\circ &= -a \end{aligned}$$

33. $f(x) = \operatorname{tg}(5x + 3)$ funksiyanın ən kiçik müsbət dövrünü tapın.

- A) 5π B) 10π C) $\frac{2\pi}{5}$ D) $\frac{\pi}{15}$ E) $\frac{\pi}{5}$

$\operatorname{tg} x$ -in ən kiçik müsbət dövrü π -dir $T(\operatorname{tg} x) = \pi$
 $\operatorname{tg}(5x+3)$ -in ən kiçik müsbət dövrü isə $\frac{\pi}{5}$ -dir $T(\operatorname{tg}(5x+3)) = \frac{\pi}{5}$
 $T(f(x))$ yəni $f(x)$ funksiyanın dövrü

34. $f(x) = \sin(3x + 5)$ funksiyanın ən kiçik müsbət dövrünü tapın.

- A) 6π B) 3π C) $\frac{\pi}{2}$ D) $\frac{2\pi}{3}$ E) $\frac{\pi}{15}$

$$\begin{aligned} T(\sin x) &= 2\pi \\ T(\sin(3x+5)) &= \frac{2\pi}{3} \end{aligned}$$

35. İfadəni sadələşdirin: $\frac{\sin(148^\circ - \alpha)}{\cos(58^\circ - \alpha)}$.

- A) $\operatorname{tg}(58^\circ - \alpha)$ B) $\operatorname{ctg}(58^\circ - \alpha)$ C) 1
 D) -1 E) $-\sin(58^\circ - \alpha)$

$$\frac{\sin(148^\circ - \alpha)}{\cos(58^\circ - \alpha)} = \frac{\sin(90^\circ + (58^\circ - \alpha))}{\cos(58^\circ - \alpha)} = \frac{\cos(58^\circ - \alpha)}{\cos(58^\circ - \alpha)} = 1$$

36. İfadəni sadələşdirin: $\frac{\cos(136^\circ + \alpha)}{\sin(46^\circ + \alpha)}$.

- A) $-\operatorname{tg}(46^\circ + \alpha)$ B) $-\operatorname{ctg}(46^\circ + \alpha)$ C) 1
 D) -1 E) $\operatorname{tg}(46^\circ - \alpha)$

$$\frac{\cos(136^\circ + \alpha)}{\sin(46^\circ + \alpha)} = \frac{\cos(90^\circ + (46^\circ + \alpha))}{\sin(46^\circ + \alpha)} = \frac{-\sin(46^\circ + \alpha)}{\sin(46^\circ + \alpha)} = -1$$

CFR

37. Hesablayın: $2 \left(\arcsin \frac{1}{2} + \arccos \frac{1}{2} \right) = 2 \left(\frac{\pi}{6} + \frac{\pi}{3} \right) = 2 \cdot \frac{\pi}{2} = \pi$

- A) $\frac{2\pi}{3}$ B) $\frac{\pi}{2}$ C) π D) 0 E) 2π

38. Hesablayın: $2 \cdot (\operatorname{arctg} \sqrt{3} + \operatorname{arccotg} \sqrt{3}) = 2 \left(\frac{\pi}{3} + \frac{\pi}{6} \right) = 2 \cdot \frac{\pi}{2} = \pi$

- A) $\frac{2\pi}{3}$ B) $\frac{\pi}{2}$ C) 0 D) 2π E) π

39. $\sin \alpha = -\frac{5}{13}$ və $\frac{3}{2}\pi < \alpha < 2\pi$ olarsa, $\operatorname{tg} \alpha$ -ni tapın.

- A) $\frac{1}{12}$ B) $-\frac{5}{12}$ C) $\frac{3}{12}$ D) $\frac{3}{12}$ E) $\frac{12}{13}$

$$\begin{aligned} \alpha \in \text{IV-cüb} \quad \operatorname{tg} \alpha &= \frac{\sin \alpha}{\cos \alpha} = \frac{-\frac{5}{13}}{\frac{12}{13}} = -\frac{5}{13} \cdot \frac{13}{12} = -\frac{5}{12} \\ \operatorname{tg} \alpha < 0 \\ \cos \alpha > 0 \quad \cos \alpha &= \sqrt{1 - \sin^2 \alpha} = \sqrt{1 - \left(-\frac{5}{13}\right)^2} = \sqrt{1 - \frac{25}{169}} = \sqrt{\frac{144-25}{169}} = \sqrt{\frac{119}{169}} = \frac{11}{13} \end{aligned}$$

40. Hesablayın: $\operatorname{arctg}(-1) + \arcsin \frac{\sqrt{2}}{2} - \arccos \left(-\frac{1}{2}\right) = -\frac{\pi}{4} + \frac{\pi}{4} - \left(\pi - \frac{\pi}{3}\right) = -\frac{2\pi}{3}$

- A) $\frac{2}{3}\pi$ B) $-\frac{\pi}{4}$ C) $\frac{2}{3}\pi$ D) $-\frac{\pi}{2}$ E) $\frac{\pi}{2}$

$$\arccos(-a) = \pi - \arccos a$$

41. Funksiyanın ən böyük qiymətini tapın. $f(x) = 3 - 2\sin 2x$.

- A) 1 B) 7 C) 5 D) 3 E) 4

$$-1 \leq \sin 2x \leq 1 \quad \text{ƏBQ } f(x) = 3 - 2 \cdot (-1) = 3 + 2 = 5$$

42. Hesablayın: $\sin 237^\circ + \cos 33^\circ + \operatorname{tg} 45^\circ = \sin(270^\circ - 33^\circ) + \cos 33^\circ + 1 =$

- A) 0 B) 1 C) 1 D) $\frac{1}{2}$ E) $\frac{1}{\sqrt{2}}$

$$= -\cos 33^\circ + \cos 33^\circ + 1 = 1$$

43. $\sin \alpha + \cos \alpha = 0,8$ olduğunu bilərək, $\sin \alpha \cdot \cos \alpha$ hasilini tapın.

- A) 0,16 B) 0,23 C) -0,15 D) -0,18 E) 1,2

$$\begin{aligned} (\sin \alpha + \cos \alpha)^2 &= 0,8^2 & 2 \sin \alpha \cos \alpha &= 0,64 - 1 \\ \sin^2 \alpha + 2 \sin \alpha \cos \alpha + \cos^2 \alpha &= 0,64 & 2 \sin \alpha \cos \alpha &= -0,36 \\ \sin^2 \alpha + \cos^2 \alpha + 2 \sin \alpha \cos \alpha &= 0,64 & \sin \alpha \cos \alpha &= -0,18 \\ 1 + 2 \sin \alpha \cos \alpha &= 0,64 & \sin \alpha \cos \alpha &= -0,18 \end{aligned}$$

44. $(\sin \alpha - \cos \alpha)^2 = \left(\frac{1}{2}\right)^2$ olarsa, $\sin \alpha \cdot \cos \alpha$ hasilini tapın.

- A) $\frac{3}{8}$ B) $\frac{5}{8}$ C) $-\frac{3}{8}$ D) $-\frac{5}{8}$ E) $\frac{1}{2}$

$$\begin{aligned} \sin^2 \alpha - 2 \sin \alpha \cos \alpha + \cos^2 \alpha &= \frac{1}{4} \\ 1 - 2 \sin \alpha \cos \alpha &= \frac{1}{4} & \sin \alpha \cos \alpha &= \frac{3}{8} \\ 2 \sin \alpha \cos \alpha &= 1 - \frac{1}{4} = \frac{3}{4} \\ \sin \alpha \cos \alpha &= \frac{3}{4} : 2 = \frac{3}{8} \end{aligned}$$

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45. Hesablayın: $\arcsin\left(-\frac{\sqrt{3}}{2}\right) + \arccos\left(-\frac{\sqrt{2}}{2}\right) + \operatorname{arctg}\frac{\sqrt{3}}{3} =$
 A) $-\frac{5}{12}\pi$ B) $-\frac{\pi}{4}$ C) $\frac{19}{12}\pi$ D) $\frac{3}{4}\pi$ E) $\frac{7}{12}\pi$
 $= -\frac{\pi}{3} + \left(\pi - \frac{\pi}{4}\right) + \frac{\pi}{6} = -\frac{\pi}{3} + \frac{3\pi}{4} + \frac{\pi}{6} = \frac{-4\pi + 9\pi + 2\pi}{12} = \frac{7\pi}{12}$

46. Funksiyanın ən kiçik qiymətini tapın: $y = 2 + 3 \cos 2x$.
 A) -1 B) -2 C) -3 D) 0 E) 2
 $-1 \leq \cos 2x \leq 1 \quad \partial KQ(y) = 2 + 3 \cdot (-1) = 2 - 3 = -1$

47. Hesablayın: $\cos 222^\circ + \sin 48^\circ + 2 \operatorname{ctg} 45^\circ =$
 A) 2 B) 1 C) $2 \cos 42^\circ$ D) $2 \sin 48^\circ$ E) 0
 $= \cos(270^\circ - 48^\circ) + \sin 48^\circ + 2 \cdot 1 = -\sin 48^\circ + \sin 48^\circ + 2 = 2$

48. Funksiyanın maksimumunu tapın: $y = \cos 3x$.
 A) 0 B) $\frac{1}{12}$ C) $\frac{\sqrt{2}}{2}$ D) 1 E) 3
 $\max(\cos 3x) = \partial KQ(\cos 3x) = 1$

49. Funksiyanın minimumunu tapın: $y = \sin 2x$.
 A) $-\frac{1}{2}$ B) -1 C) $-\frac{\sqrt{2}}{2}$ D) $-\frac{\sqrt{3}}{2}$ E) -2
 $\min(\sin 2x) = \partial KQ(\sin 2x) = -1$

50. Hesablayın: $\arccos\left(-\frac{\sqrt{3}}{2}\right) + \arcsin\frac{1}{2} + \operatorname{arctg}(-\sqrt{3}) =$
 A) $\frac{\pi}{3}$ B) $\frac{\pi}{6}$ C) $\frac{7}{6}\pi$ D) $\frac{2\pi}{3}$ E) $-\frac{\pi}{6}$
 $= \pi - \frac{\pi}{6} + \frac{\pi}{6} + \left(-\frac{\pi}{3}\right) = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$

51. Üçbucağın iki bucağının cəminin sinusu $\frac{\sqrt{3}}{4}$ -ə bərabərdir. Üçüncü bucağın sinusunu tapın.
 A) $\frac{1}{4}$ B) $\frac{\sqrt{3}}{4}$ C) $\frac{\sqrt{3}}{4}$ D) $-\frac{1}{4}$ E) $\frac{\sqrt{3}}{2}$
 $\alpha + (\beta + \gamma) = \pi \quad \alpha = \pi - (\beta + \gamma)$
 $\sin(\beta + \gamma) = \frac{\sqrt{3}}{4} \quad \sin \alpha = \sin(\pi - (\beta + \gamma)) = \sin(\beta + \gamma) = \frac{\sqrt{3}}{4}$
 $\sin \alpha = ? \quad \sin \alpha = \frac{\sqrt{3}}{4}$

52. Hesablayın: $\cos(\arcsin\frac{\sqrt{3}}{2}) = \cos\frac{\pi}{3} = \frac{1}{2}$
 A) $\frac{\sqrt{3}}{2}$ B) $-\frac{1}{2}$ C) -1 D) $-\frac{\sqrt{3}}{2}$ E) $\frac{1}{2}$

53. Hesablayın: $\operatorname{tg} 60^\circ \cdot \operatorname{tg} 50^\circ \cdot \operatorname{tg} 45^\circ \cdot \operatorname{tg} 40^\circ \cdot \operatorname{tg} 30^\circ =$
 A) 1 B) $\frac{\sqrt{3}}{2}$ C) 3 D) $3\sqrt{3}$ E) $\sqrt{3}$
 $= \operatorname{tg}(90^\circ - 30^\circ) \cdot \operatorname{tg}(90^\circ - 40^\circ) \cdot 1 \cdot \operatorname{tg} 40^\circ \cdot \operatorname{tg} 30^\circ =$
 $= \operatorname{ctg} 30^\circ \cdot \operatorname{ctg} 40^\circ \cdot \operatorname{tg} 40^\circ \cdot \operatorname{tg} 30^\circ = 1$

54. Hesablayın: $2 \cos \pi - 2 \sin \frac{\pi}{6} = 2 \cdot (-1) - 2 \cdot \frac{1}{2} = -2 - 1 = -3$
 A) 3 B) -3 C) 1 D) -1 E) 0

55. İfadənin ən böyük qiymətini tapın: $3 \sin 2x - 4$.
 A) -1 B) 0 C) 1 D) 2 E) -4
 $\partial BQ(3 \sin 2x - 4) = 3 \cdot 1 - 4 = 3 - 4 = -1$

56. İfadənin ən kiçik qiymətini tapın: $5 - 2 \cos 3x$.
 A) -1 B) 5 C) 3 D) -2 E) 7
 $\partial KQ(5 - 2 \cos 3x) = 5 - 2 \cdot 1 = 5 - 2 = 3$

57. Hesablayın: $\frac{\sin 1^\circ \cdot \sin 2^\circ \cdot \sin 3^\circ \cdot \dots \cdot \sin 10^\circ}{\cos 89^\circ \cdot \cos 88^\circ \cdot \cos 87^\circ \cdot \dots \cdot \cos 80^\circ} = \frac{\sin 1^\circ \cdot \sin 2^\circ \cdot \sin 3^\circ \cdot \dots \cdot \sin 10^\circ}{\sin 90^\circ \cdot \sin 89^\circ \cdot \sin 88^\circ \cdot \dots \cdot \sin 80^\circ} = 1$
 A) 0 B) 1 C) -1 D) $\frac{1}{2}$ E) $-\frac{1}{2}$
 $\sin(90^\circ - \alpha) = \cos \alpha$
 $\cos(90^\circ - \alpha) = \sin \alpha$ *qevimə distributorena görə böyük bucaqları kiçik bucaqların trigonometrik ifadələri ilə əvəz edib ixtisar edə bilərik.*

58. İfadənin qiymətini hesablayın:
 $4 \cos 180^\circ + \frac{\sqrt{3}}{2} \cos \frac{\pi}{2} + \frac{\sqrt{3}}{2} \sin 180^\circ + 4 \sin \frac{\pi}{2} =$
 A) 8 B) -4 C) 4 D) 0 E) $\frac{\sqrt{3}}{2}$
 $= 4 \cdot (-1) + \frac{\sqrt{3}}{2} \cdot 0 + \frac{\sqrt{3}}{2} \cdot 0 + 4 \cdot 1 = -4 + 0 + 0 + 4 = 0$

59. α və β qonşu bucaqlar, $\sin \alpha = \frac{1}{3}$ olarsa, $\sin \beta$ -ni tapın.
 A) $\frac{1}{3}$ B) 1 C) -1 D) 0 E) $\frac{2\sqrt{2}}{3}$

$\alpha + \beta = 180^\circ$
 $\beta = 180^\circ - \alpha$
 $\sin \beta = \sin(180^\circ - \alpha) = \sin \alpha = \frac{1}{3}$
qonşu bucaqların sinusları bərabərdir!

60. İfadəni sadələşdirin: $\left(\frac{1}{\cos^2 \alpha} - 1\right) \cdot \operatorname{ctg}^2 \alpha = \frac{1 - \cos^2 \alpha}{\cos^2 \alpha} \cdot \frac{\cos^2 \alpha}{\sin^2 \alpha} = \frac{\sin^2 \alpha}{\sin^2 \alpha} = 1$
 A) $\cos \alpha$ B) $\sin \alpha$ C) 1,2 D) 1 E) 2

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61. Hesablayın: $\frac{\operatorname{tg} 25^\circ + \operatorname{tg} 20^\circ}{1 - \operatorname{tg} 25^\circ \cdot \operatorname{tg} 20^\circ} = \operatorname{tg}(25^\circ + 20^\circ) = \operatorname{tg} 45^\circ = 1$
 A) $\sqrt{3}$ B) $\sqrt{2}$ C) $\frac{\sqrt{5}}{2}$ **D) 1** E) -1

62. Hesablayın: $\frac{\cos 31^\circ \cdot \cos 32^\circ \cdot \cos 33^\circ \cdot \dots \cdot \cos 38^\circ \cdot \cos 39^\circ}{\sin 51^\circ \cdot \sin 52^\circ \cdot \sin 53^\circ \cdot \dots \cdot \sin 58^\circ \cdot \sin 59^\circ} =$
A) 1 B) $\frac{1}{2}$ C) 2 D) $\sqrt{2}$ E) $\frac{\sqrt{2}}{2}$
 $= \frac{\cos 31^\circ \cdot \cos 32^\circ \cdot \cos 33^\circ \cdot \dots \cdot \cos 38^\circ \cdot \cos 39^\circ}{\cos 39^\circ \cdot \cos 38^\circ \cdot \cos 37^\circ \cdot \dots \cdot \cos 32^\circ \cdot \cos 31^\circ} = 1$
Sin(90°-α) = cos α ceviri bu düsturu ifa maxaradani sinustan cosinustara çevireb ixtisar etdik. mes. sin 51° = cos 39°

63. Hesablayın: $\frac{(\sin 2\alpha - \cos 2\alpha)^2}{1 - \sin 4\alpha}$; $\alpha \neq \frac{\pi}{8} + \frac{\pi k}{2}$.
A) 1 B) 0 C) -1 D) $\sin 4\alpha$ E) $\cos 2\alpha$
 $= \frac{\sin^2 2\alpha - 2\sin 2\alpha \cos 2\alpha + \cos^2 2\alpha}{1 - \sin 4\alpha} = \frac{1 - \sin 4\alpha}{1 - \sin 4\alpha} = 1$
 $\& \sin \alpha \cdot \cos \alpha = \sin 2\alpha$

64. İfadeni sadələşdirin: $(\frac{1}{\sin^2 \alpha} - 1) \cdot \operatorname{tg}^2 \alpha = \frac{1 - \sin^2 \alpha}{\sin^2 \alpha} \cdot \frac{\sin^2 \alpha}{\cos^2 \alpha} =$
A) 1 B) 0 C) $\sin^2 \alpha$ D) $\cos^2 \alpha$ E) $\operatorname{tg}^2 \alpha$
 $= \frac{\cos^2 \alpha}{\cos^2 \alpha} = 1$

65. Hesablayın: $\frac{\sin 34^\circ}{1 - \cos 34^\circ} - \frac{1 + \cos 34^\circ}{\sin 34^\circ} = \frac{\sin^2 34^\circ - (1 - \cos^2 34^\circ)}{(1 - \cos 34^\circ) \cdot \sin 34^\circ} =$
A) 0 B) 1 C) -1 D) $\cos 34^\circ$ E) $\sin 34^\circ$
 $= \frac{\sin^2 34^\circ - \sin^2 34^\circ}{(1 - \cos 34^\circ) \cdot \sin 34^\circ} = \frac{0}{(1 - \cos 34^\circ) \cdot \sin 34^\circ} = 0$

66. Hesablayın:
 $\sin \frac{\pi}{6} + 2 \cos 2\pi + \frac{1}{3} \operatorname{ctg}^2 \frac{\pi}{6} + 4 \sin \frac{3}{2}\pi - \operatorname{tg} \frac{\pi}{4} + 3 \sin \pi =$
 A) $\frac{\sqrt{2}-1}{2}$ B) $\frac{\sqrt{2}+3}{2}$ C) -1 **D) -1,5** E) -2,5
 $= \frac{1}{2} + 2 \cdot 1 + \frac{1}{3} \cdot \sqrt{3}^2 + 4 \cdot (-1) - 1 + 3 \cdot 0 = \frac{1}{2} + 2 + 1 - 4 - 1 + 0 =$
 $= \frac{1}{2} - 2 = \frac{1-4}{2} = -\frac{3}{2} = -1,5$

67. Hesablayın: $\sin 750^\circ + \operatorname{ctg} 945^\circ + \cos 1140^\circ + \operatorname{tg}(-495^\circ) =$
 A) 0 B) 1 C) 2 **D) 3** E) -2
 $= \sin(2 \cdot 360^\circ + 30^\circ) + \operatorname{ctg}(5 \cdot 180^\circ + 45^\circ) + \cos(3 \cdot 360^\circ + 60^\circ) + \operatorname{tg}(-3 \cdot 180^\circ + 45^\circ) =$
 $= \sin 30^\circ + \operatorname{ctg} 45^\circ + \cos 60^\circ + \operatorname{tg} 45^\circ = \frac{1}{2} + 1 + \frac{1}{2} + 1 = 3$

68. Hesablayın: $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} + \sin^2 \frac{\pi}{4} + \operatorname{tg}^2 \frac{\pi}{3} - \operatorname{ctg}^2 \frac{\pi}{6} =$
 A) $\frac{1}{2}$ **B) 1** C) $1\frac{1}{2}$ D) $3\frac{2}{3}$ E) $2\frac{1}{4}$
 $= (\frac{1}{2})^2 + (\frac{1}{2})^2 + (\frac{\sqrt{2}}{2})^2 + \sqrt{3}^2 - \sqrt{3}^2 = \frac{1}{4} + \frac{1}{4} + \frac{2}{4} + 3 - 3 = \frac{4}{4} = 1$

69. $y = 5 \sin(x + \frac{\pi}{4})$ funksiyasının qiymətler oblastını tapın.
 A) (-5; 5) B) (5; +∞) C) (-∞; -5) D) (0; 5) **E) [-5; 5]**
 $-1 \leq \sin(x + \frac{\pi}{4}) \leq 1$
 $-5 \leq 5 \sin(x + \frac{\pi}{4}) \leq 5$
 $[-5; 5]$

70. Hesablayın: $\operatorname{tg} 15^\circ \cdot \operatorname{tg} 75^\circ = \operatorname{tg} 15^\circ \cdot \operatorname{tg}(90^\circ - 15^\circ) = \operatorname{tg} 15^\circ \cdot \operatorname{ctg} 15^\circ = 1$
 A) $-\sqrt{3}$ B) -1 C) $\sqrt{3}$ D) $\frac{\sqrt{3}}{2}$ **E) 1**

71. $y = 3 \cos(x - \frac{\pi}{6})$ funksiyasının qiymətler oblastını tapın.
A) [-3; 3] B) [0; 3] C) [-1; 1] D) [-1; 3] E) [-3; 1]
 $\cos(x - \frac{\pi}{6}) \in [-1; 1]$
 $y = 3 \cos(x - \frac{\pi}{6}) \in 3 \cdot [-1; 1] = [-3; 3]$

72. İfadeni sadələşdirin: $-\sin^2 \alpha + \operatorname{tg} \alpha \cdot \operatorname{ctg} \alpha - \cos^2 \alpha =$
A) 0 B) -2 C) 1 D) 2 E) -1
 $= -(\sin^2 \alpha + \cos^2 \alpha) + 1 = -1 + 1 = 0$

73. $x = 4 \operatorname{tg} \alpha, y = 3 \operatorname{ctg} \alpha$ olarsa, $x \cdot y$ hasilini tapın.
A) 12 B) $12 \operatorname{tg} \alpha$ C) $12 \operatorname{ctg} \alpha$ D) 6 E) 1
 $x \cdot y = 4 \operatorname{tg} \alpha \cdot 3 \operatorname{ctg} \alpha = 4 \cdot 3 \cdot \operatorname{tg} \alpha \cdot \operatorname{ctg} \alpha = 12 \cdot 1 = 12$

74. Sadələşdirin: $\operatorname{tg} \alpha \cdot \operatorname{tg}(\frac{\pi}{2} + \alpha) = \operatorname{tg} \alpha \cdot (-\operatorname{ctg} \alpha) = -\operatorname{tg} \alpha \cdot \operatorname{ctg} \alpha = -1$
A) -1 B) $\operatorname{tg}^2 \alpha$ C) 1 D) 0 E) $\operatorname{ctg} \alpha$

75. Sadələşdirin: $\sin \alpha + \sin(180^\circ + \alpha) = \sin \alpha + (-\sin \alpha) = 0$
A) 0 B) $2 \sin \alpha$ C) $\sin \alpha + \cos \alpha$
 D) $\sin 2\alpha$ E) $\sin \alpha - \cos \alpha$

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IV rübdə $\sin x < 0$ mənfi dir.

76. Üçbucağın iki bucağının radian ölçüsü $\frac{\pi}{4}$ və $\frac{\pi}{6}$ -dir. Üçbucağın bucaqlarının dərəcə ölçüsünü tapın.
 A) $45^\circ; 30^\circ; 105^\circ$ B) $45^\circ; 60^\circ; 75^\circ$
 C) $15^\circ; 75^\circ; 90^\circ$ D) $45^\circ; 30^\circ; 55^\circ$
 A) $15^\circ; 60^\circ; 100^\circ$

$\frac{\pi}{4} \approx \frac{180^\circ}{4} = 45^\circ$
 $\frac{\pi}{6} = \frac{180^\circ}{6} = 30^\circ$
 üçüncü bucaq $180^\circ - (45^\circ + 30^\circ) = 180^\circ - 75^\circ = 105^\circ$ -dir.

77. Hesablayın: $\frac{\cos(-120^\circ)}{\sin(-330^\circ)} = \frac{\cos 120^\circ}{-\sin 330^\circ} = \frac{\cos(90^\circ+30^\circ)}{-\sin(360^\circ-30^\circ)} = \frac{-\sin 30^\circ}{-(-\sin 30^\circ)} = \frac{-\sin 30^\circ}{\sin 30^\circ} = -1$
 A) $\sqrt{3}$ B) 1 C) -1 D) $-\sqrt{3}$ E) $-\frac{1}{\sqrt{3}}$

78. Hesablayın: $\frac{\cos(-230^\circ)}{\sin(-150^\circ)} = \frac{\cos 230^\circ}{-\sin 150^\circ} = \frac{\cos(360^\circ-30^\circ)}{-\sin(180^\circ-30^\circ)} = \frac{\cos 30^\circ}{-\sin 30^\circ} = -\cot 30^\circ = -\sqrt{3}$
 A) $-\sqrt{3}$ B) $\sqrt{3}$ C) $-\frac{2\sqrt{3}}{3}$ D) $-\frac{2\sqrt{3}}{3}$ E) $-\frac{1}{2\sqrt{3}}$

79. Hesablayın: $\sqrt{2}(\operatorname{tg} 22,5^\circ + \frac{1}{\operatorname{tg} 22,5^\circ}) = \sqrt{2}(\frac{\sin 22,5^\circ}{\cos 22,5^\circ} + \frac{\cos 22,5^\circ}{\sin 22,5^\circ}) = \sqrt{2} \frac{\sin^2 22,5^\circ + \cos^2 22,5^\circ}{\sin 22,5^\circ \cos 22,5^\circ} = \sqrt{2} \frac{2}{2 \sin 22,5^\circ \cos 22,5^\circ} = \frac{2}{\sin 45^\circ} = \frac{2}{\frac{\sqrt{2}}{2}} = \frac{2 \cdot 2}{\sqrt{2}} = \frac{4\sqrt{2}}{\sqrt{2}} = 2\sqrt{2}$
 A) 4 B) 2 C) 1 D) $2\sqrt{2}$ E) $\sqrt{2}$

80. $\sin 123^\circ = a$ olarsa, $\cos 246^\circ$ -ni tapın.
 A) $2a\sqrt{1-a^2}$ B) $2a$ C) $2a^2 - 1$
 D) $-2a\sqrt{1-a^2}$ E) $1 - 2a^2$
 $\cos 246^\circ = \cos 2 \cdot 123^\circ = 1 - 2\sin^2 123^\circ = 1 - 2a^2$
 $\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha = 1 - \sin^2 \alpha - \sin^2 \alpha = 1 - 2\sin^2 \alpha$

81. $\sin 56^\circ = a$ olarsa, $\cos 112^\circ$ -ni tapın.
 A) $2a$ B) $2a^2 - 1$ C) $1 - 2a^2$ D) $1 + 2a^2$ E) $1 - 2a$
 $\cos 112^\circ = \cos 2 \cdot 56^\circ = 1 - 2\sin^2 56^\circ = 1 - 2a^2$

82. Hesablayın: $\operatorname{tg}^2 10^\circ (\frac{1}{\cos^2 80^\circ} - 1) = \operatorname{tg}^2 10^\circ (\frac{1}{\sin^2 10^\circ} - 1) = \frac{\sin^2 10^\circ}{\cos^2 10^\circ} \cdot \frac{1 - \sin^2 10^\circ}{\sin^2 10^\circ} = \frac{\cos^2 10^\circ}{\cos^2 10^\circ} = 1$
 A) 1 B) $\operatorname{tg}^2 10^\circ$ C) 0 D) $\operatorname{ctg}^2 10^\circ$ E) $\operatorname{tg} 10^\circ$
 $\cos 80^\circ = \sin 10^\circ$
 $\cos(90^\circ - \alpha) = \sin \alpha$
 $\sin(90^\circ - \alpha) = \cos \alpha$

83. $\cos x = -0,7$ və $180^\circ < x < 270^\circ$ olarsa, $\sin x$ -in qiymətini tapın.
 A) $\sqrt{0,51}$ B) $-\sqrt{0,51}$ C) $-0,3$ D) $0,3$ E) $\sqrt{0,3}$
 $\sin x = -\sqrt{1 - \cos^2 x} = -\sqrt{1 - 0,49} = -\sqrt{0,51}$

I rübdə $\cos x > 0$

84. $\sin x = 0,3$ və $0^\circ < x < 90^\circ$ olarsa, $\cos x$ -in qiymətini tapın.
 A) $\sqrt{91}$ B) $\frac{2}{\sqrt{91}}$ C) $\frac{\sqrt{91}}{33}$ D) $\frac{2\sqrt{91}}{22}$ E) $\frac{\sqrt{91}}{10}$
 $\cos x = \sqrt{1 - \sin^2 x} = \sqrt{1 - 0,09} = \sqrt{0,91} = \sqrt{\frac{91}{100}} = \frac{\sqrt{91}}{10}$

$\frac{2\pi}{3} = \frac{\pi}{2} + \frac{\pi}{6} = \frac{4\pi}{6} = \frac{2\pi}{3}$

85. Sadələşdirin: $\cos(\frac{2\pi}{3} - \alpha) + \sin(\frac{\pi}{6} - \alpha) = \cos(\frac{\pi}{2} + (\frac{\pi}{6} - \alpha)) + \sin(\frac{\pi}{2} - \alpha) = -\sin(\frac{\pi}{6} - \alpha) + \cos(\frac{\pi}{6} - \alpha) = 0$
 A) 0 B) $\cos \alpha$ C) $-\sin \alpha$ D) $-\sqrt{3} \sin \alpha$ E) $-\sqrt{3} \cos \alpha$

86. Sadələşdirin: $\sin(\frac{\pi}{6} - \alpha) + \cos(\frac{\pi}{3} + \alpha) = \sin(\frac{\pi}{2} - (\frac{\pi}{3} - \alpha)) - \cos(\frac{\pi}{3} + \alpha) = \cos(\frac{\pi}{3} - \alpha) - \cos(\frac{\pi}{3} + \alpha) = 0$
 A) 0 B) $\sin \alpha$ C) $\cos \alpha$ D) $\sqrt{3} \sin \alpha$ E) $\sqrt{3} \cos \alpha$

87. $y = 4\operatorname{tg} 5x$ funksiyasının ən kiçik müsbət dövrünü tapın.
 A) $\frac{\pi}{4}$ B) $\frac{\pi}{20}$ C) $\frac{4\pi}{5}$ D) $\frac{\pi}{5}$ E) 5π

$T(4\operatorname{tg} 5x) = \frac{\pi}{5}$

88. $y = 3\operatorname{tg} \frac{3x}{4}$ funksiyasının ən kiçik müsbət dövrünü tapın.
 A) $\frac{\pi}{4}$ B) $\frac{3\pi}{4}$ C) $\frac{4\pi}{3}$ D) 3π E) 4π

$T(3\operatorname{tg} \frac{3x}{4}) = \frac{\pi}{\frac{3}{4}} = \frac{4\pi}{3}$

89. Hesablayın: $3 \sin \pi - 4 \cos \pi + 2 \operatorname{tg} \frac{\pi}{4} = 3 \cdot 0 - 4(-1) + 2 \cdot 1 = 0 + 4 + 2 = 6$
 A) 4 B) 3 C) 6 D) 0 E) 1

90. α və β qonşu bucaqlardır. $\cos \alpha = \frac{1}{4}$ olarsa, $\cos \beta$ -ni tapın.
 A) $\frac{1}{4}$ B) $\frac{3}{4}$ C) $-\frac{1}{4}$ D) $-\frac{3}{4}$ E) $\frac{\sqrt{15}}{4}$

$\alpha + \beta = 180^\circ$
 $\beta = 180^\circ - \alpha$
 $\cos \beta = \cos(180^\circ - \alpha) = -\cos \alpha = -\frac{1}{4}$

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$\alpha \in \text{IV} \cup \text{II}$ $\text{ctg} \alpha < 0$ $\sin \alpha < 0$

91. $\cos \alpha = \frac{1}{\sqrt{3}}$ və $-\frac{\pi}{2} < \alpha < 0$ olduğunu bilərək, $\text{ctg} \alpha$ -ni tapın.

- (A) $-\frac{\sqrt{2}}{2}$ (B) $-\sqrt{2}$ (C) $\frac{\sqrt{2}}{2}$ (D) $\sqrt{\frac{2}{3}}$ (E) $\sqrt{2}$

$$\text{ctg} \alpha = \frac{\cos \alpha}{\sin \alpha} = \frac{\frac{1}{\sqrt{3}}}{-\frac{\sqrt{2}}{2}} = -\frac{1}{\sqrt{3}} \cdot \frac{2}{\sqrt{2}} = -\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = -\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = -\frac{\sqrt{2}}{\sqrt{3}} = -\frac{\sqrt{6}}{3}$$

$$\sin \alpha = -\sqrt{1 - \cos^2 \alpha} = -\sqrt{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = -\sqrt{1 - \frac{1}{3}} = -\sqrt{\frac{2}{3}} = -\frac{\sqrt{6}}{3}$$

92. İfadəni sadələşdirin: $\frac{\text{tg} \alpha}{1 + \text{tg} \alpha} + \frac{\text{tg}(\alpha + \pi)}{1 - \text{tg} \alpha} = \frac{\text{tg} \alpha}{1 + \text{tg} \alpha} + \frac{\text{tg} \alpha}{1 - \text{tg} \alpha} =$

- (A) $\text{tg}^2 \alpha$ (B) $\text{tg} \alpha$ (C) $\text{tg}^2 2\alpha$ (D) $\text{tg} 2\alpha$ (E) $\text{ctg} 2\alpha$

$$= \frac{\text{tg} \alpha \cdot (1 - \text{tg} \alpha) + \text{tg} \alpha \cdot (1 + \text{tg} \alpha)}{(1 + \text{tg} \alpha) \cdot (1 - \text{tg} \alpha)} = \frac{\text{tg} \alpha - \text{tg}^2 \alpha + \text{tg} \alpha + \text{tg}^2 \alpha}{1 - \text{tg}^2 \alpha} = \frac{2 \text{tg} \alpha}{1 - \text{tg}^2 \alpha} = \text{tg} 2\alpha$$

93. $y = 2 \sin \frac{x}{5}$ funksiyasının ən kiçik müsbət dövrünü tapın.

- (A) 3π (B) 2π (C) 14π (D) 10π (E) 6π

$$T\left(2 \sin \frac{x}{5}\right) = \frac{2\pi}{\frac{1}{5}} = 10\pi$$

94. $y = 5 \sin 3x$ funksiyasının ən kiçik müsbət dövrünü tapın.

- (A) 6π (B) $\frac{2\pi}{3}$ (C) $\frac{2\pi}{5}$ (D) 2π (E) π

$$T(5 \sin 3x) = \frac{2\pi}{3}$$

$\alpha \in \text{I} \cup \text{IV}$ $\text{tg} \alpha > 0$, $\cos \alpha > 0$

95. $\sin \alpha = \frac{1}{\sqrt{3}}$ və $0 < \alpha < \frac{\pi}{2}$ olduğunu bilərək, $\text{tg} \alpha$ -ni tapın.

- (A) $-\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{\sqrt{3}}$

$$\text{tg} \alpha = \frac{\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{\sqrt{1 - \sin^2 \alpha}} = \frac{\frac{1}{\sqrt{3}}}{\sqrt{1 - \left(\frac{1}{\sqrt{3}}\right)^2}} = \frac{\frac{1}{\sqrt{3}}}{\sqrt{1 - \frac{1}{3}}} = \frac{\frac{1}{\sqrt{3}}}{\sqrt{\frac{2}{3}}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

$$\cos \alpha = \sqrt{1 - \sin^2 \alpha} = \sqrt{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = \sqrt{1 - \frac{1}{3}} = \sqrt{\frac{2}{3}} = \frac{\sqrt{6}}{3}$$

96. Hesablayın: $\frac{(\sin \alpha + \cos \alpha)^2}{1 + \sin 2\alpha}$, $\alpha \neq \frac{\pi}{4} + \pi k, k \in \mathbb{Z}$.

- (A) $\text{tg} \alpha$ (B) 1 (C) 2 (D) $\sin \alpha$ (E) $\frac{1}{\sin \alpha} + 1$

$$\frac{(\sin \alpha + \cos \alpha)^2}{1 + \sin 2\alpha} = \frac{\sin^2 \alpha + 2 \sin \alpha \cos \alpha + \cos^2 \alpha}{1 + \sin 2\alpha} = \frac{1 + \sin 2\alpha}{1 + \sin 2\alpha} = 1$$

97. İfadəni sadələşdirin:

$$(1 + \sin \alpha)(1 - \sin \alpha) + (1 + \cos \alpha)(1 - \cos \alpha) =$$

- (A) 0 (B) 1 (C) 2 (D) -1 (E) -2

$$= 1 - \sin^2 \alpha + 1 - \cos^2 \alpha = 1 + 1 - (\sin^2 \alpha + \cos^2 \alpha) = 2 - 1 = 1$$

98. Hesablayın: $(\cos 30^\circ + \sin 60^\circ) \cdot \text{tg} 60^\circ = \left(\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2}\right) \cdot \sqrt{3} = \frac{2\sqrt{3}}{2} \cdot \sqrt{3} =$

- (A) $\frac{1}{2}$ (B) $\sqrt{3}$ (C) $\frac{2}{3}$ (D) $\frac{\sqrt{3}}{2}$ (E) 3

$$= \sqrt{3} \cdot \sqrt{3} = \sqrt{3}^2 = 3$$

99. Hesablayın: $\frac{\cos 150^\circ - 5 \sin 200^\circ}{\text{tg} 240^\circ} = \frac{\cos(180^\circ - 30^\circ) - 5 \sin(180^\circ + 20^\circ)}{\text{tg}(180^\circ + 60^\circ)} =$

- (A) -2 (B) -1 (C) 1 (D) 2 (E) $\sqrt{3}$

$$= \frac{-\cos 30^\circ - 5(-\cos 30^\circ)}{\text{tg} 60^\circ} = \frac{-\cos 30^\circ + 5 \cos 30^\circ}{\sqrt{3}} = \frac{4 \cos 30^\circ}{\sqrt{3}} = \frac{4 \cdot \frac{\sqrt{3}}{2}}{\sqrt{3}} = \frac{4\sqrt{3}}{2\sqrt{3}} = 2$$

100. Hesablayın: $\frac{\cos 240^\circ - 3 \sin 330^\circ}{\text{ctg} 225^\circ} = \frac{\cos(180^\circ + 60^\circ) - 3 \sin(270^\circ + 60^\circ)}{\text{ctg}(180^\circ + 45^\circ)} =$

- (A) 1 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) -2 (E) 4

$$= \frac{-\cos 60^\circ - 3(-\cos 60^\circ)}{\text{ctg} 45^\circ} = \frac{-\cos 60^\circ + 3 \cos 60^\circ}{1} = 2 \cos 60^\circ = 2 \cdot \frac{1}{2} = 1$$

101. Hesablayın: $\frac{\sin 27^\circ}{1 + \cos 27^\circ} - \frac{1 - \cos 27^\circ}{\sin 27^\circ} = \frac{\sin^2 27^\circ - (1 - \cos^2 27^\circ)}{(1 + \cos 27^\circ) \cdot \sin 27^\circ} =$

- (A) 1 (B) -1 (C) 2 (D) 0 (E) $1/2$

$$= \frac{\sin^2 27^\circ - \sin^2 27^\circ}{(1 + \cos 27^\circ) \cdot \sin 27^\circ} = 0$$

102. Sadələşdirin: $\text{ctg}\left(\frac{3\pi}{2} + \alpha\right) \cdot \text{ctg}(\pi - \alpha) - \sin\left(\frac{\pi}{2} + \alpha\right) \cos(\pi - \alpha) =$

- (A) $1 + \cos^2 \alpha$ (B) $\sin^2 \alpha$ (C) 1 (D) $\cos^2 \alpha$ (E) $1 + \sin^2 \alpha$

$$= -\text{tg} \alpha \cdot (-\text{ctg} \alpha) - \cos \alpha (-\cos \alpha) = 1 + \cos^2 \alpha$$

103. Hesablayın: $\cos 130^\circ + \sin 80^\circ - \sin 20^\circ =$

- (A) -1 (B) $-\frac{1}{2}$ (C) 0 (D) $\frac{1}{2}$ (E) 1

$$= \cos(90^\circ + 40^\circ) + \sin 80^\circ - \sin 20^\circ = -\sin 40^\circ + \sin 80^\circ - \sin 20^\circ =$$

$$= \sin 80^\circ - \sin 40^\circ - \sin 20^\circ = 2 \cos \frac{80^\circ + 40^\circ}{2} \cdot \sin \frac{80^\circ - 40^\circ}{2} - \sin 20^\circ =$$

$$= 2 \cos 60^\circ \cdot \sin 20^\circ - \sin 20^\circ = 2 \cdot \frac{1}{2} \cdot \sin 20^\circ - \sin 20^\circ = \sin 20^\circ - \sin 20^\circ = 0$$

104. İfadəni sadələşdirin: $(1 - \cos^2 \alpha) \text{tg}^2 \alpha + 1 - \text{tg}^2 \alpha =$

- (A) $\sin^2 \alpha$ (B) $-\cos^2 \alpha$ (C) $\cos^2 \alpha$ (D) $-\sin^2 \alpha$ (E) $\text{tg}^2 \alpha$

$$= \text{tg}^2 \alpha - \cos^2 \alpha \cdot \text{tg}^2 \alpha + 1 - \text{tg}^2 \alpha = -\cos^2 \alpha \cdot \frac{\sin^2 \alpha}{\cos^2 \alpha} + 1 = -\sin^2 \alpha + 1 =$$

$$= 1 - \sin^2 \alpha = \cos^2 \alpha$$

105. Aşağıdakı funksiyalardan hansı təkdir?

- (A) $y = x \sin x$ (B) $y = \sin x \text{tg} x$ (C) $y = \cos x \text{ctg} x$

- (D) $y = |\sin x|$ (E) $y = \sin^2 x$

106. Aşağıdakılardan hansı dövrü funksiya deyil?

- (A) $y = \sin x + \cos x$ (B) $y = \cos^2 x$ (C) $y = \text{tg} x + \text{ctg} x$

- (D) $y = |\sin x|$ (E) $y = \cos x^2$

$$\{(x + T) = f(x) \quad \cos(x + 2\pi)^2 = \cos(x^2 + 4x\pi + 4\pi^2) \neq \cos x^2$$

TRİQONOMETRİK FUNKSİYALAR

107. Aşağıdakılardan hansı dövrü funksiyadır?

- A) $y = x \sin x$ B) $y = \sin(x + 1)$ C) $y = \sin \frac{3x}{2}$
 D) $y = \sin x^2$ E) $y = x - \sin x$

108. $\sin \alpha + \cos \alpha = -\sqrt{2}$ isə α hansı rübün bucağıdır?

- A) I B) II C) III D) IV E) heç birinin

$$\begin{aligned} \sin \alpha + \sin(90^\circ - \alpha) &= 2 \sin \frac{\alpha + 90^\circ - \alpha}{2} \cdot \cos \frac{\alpha - (90^\circ - \alpha)}{2} = \\ &= 2 \sin \frac{\alpha + 90^\circ - \alpha}{2} \cdot \cos \frac{\alpha - 90^\circ + \alpha}{2} = 2 \sin 45^\circ \cdot \cos \frac{2\alpha - 90^\circ}{2} = \sqrt{2} \cos \frac{2(\alpha - 45^\circ)}{2} \\ &= \sqrt{2} \cos(\alpha - 45^\circ) = -\sqrt{2} \\ \cos(\alpha - 45^\circ) &= -\sqrt{2} \cdot \frac{1}{\sqrt{2}} \\ \cos(\alpha - 45^\circ) &= -1 \\ \alpha - 45^\circ &= 180^\circ \quad \alpha = 180^\circ + 45^\circ = 225^\circ \in \text{III} \text{ rüb} \end{aligned}$$

109. $\operatorname{tg} \frac{\alpha}{2} = 2$ olduğunu bilərək, $\frac{2 \sin \alpha - \sin 2\alpha}{2 \sin \alpha + \sin 2\alpha}$ ifadəsinin qiymətini tapın.

- A) 1 B) 2 C) 1/2 D) 1/4 E) 4

$$\begin{aligned} \frac{2 \sin \alpha - \sin 2\alpha}{2 \sin \alpha + \sin 2\alpha} &= \frac{2 \sin \alpha - 2 \sin \alpha \cos \alpha}{2 \sin \alpha + 2 \sin \alpha \cos \alpha} = \frac{2 \sin \alpha (1 - \cos \alpha)}{2 \sin \alpha (1 + \cos \alpha)} = \\ &= \frac{1 - \cos \alpha}{1 + \cos \alpha} = \frac{1 - \cos^2 \frac{\alpha}{2} + \sin^2 \frac{\alpha}{2}}{1 + \cos^2 \frac{\alpha}{2} - \sin^2 \frac{\alpha}{2}} = \frac{2 \sin^2 \frac{\alpha}{2}}{2 \cos^2 \frac{\alpha}{2}} = \operatorname{tg}^2 \frac{\alpha}{2} = 2^2 = 4 \end{aligned}$$

110. φ bucağının III rübə düşdüyünü bilərək, $\cos \varphi - |\cos \varphi|$ ifadəsini sadələşdirin.

- A) 0 B) $\cos \varphi$ C) $2 \cos \varphi$ D) 1 E) -1

$\varphi \in \text{III}$ rüb. $\cos \varphi < 0$
 $|\cos \varphi| = -\cos \varphi$
 $\cos \varphi - |\cos \varphi| = \cos \varphi - (-\cos \varphi) = \cos \varphi + \cos \varphi = 2 \cos \varphi$

111. İfadəni sadələşdirin: $2 \cos^4 \alpha \cdot \operatorname{tg}^2 \alpha + \sin^4 \alpha + \cos^4 \alpha =$

- A) 2 B) 1 C) 0 D) -1 E) -2

$$\begin{aligned} &= 2 \cos^4 \alpha \cdot \frac{\sin^2 \alpha}{\cos^2 \alpha} + \sin^4 \alpha + \cos^4 \alpha = \\ &= \sin^4 \alpha + 2 \sin^2 \alpha \cdot \cos^2 \alpha + \cos^4 \alpha = (\sin^2 \alpha + \cos^2 \alpha)^2 = 1^2 = 1 \end{aligned}$$

112. φ bucağının IV rübə düşdüyünü bilərək, $\sin \varphi - |\sin \varphi|$ ifadəsini sadələşdirin.

- A) $2 \sin \varphi$ B) 0 C) $\sin \varphi$ D) $-\sin \varphi$ E) $-2 \sin \varphi$

$\varphi \in \text{IV}$ $\sin \varphi < 0$
 $|\sin \varphi| = -\sin \varphi$
 $\sin \varphi - |\sin \varphi| = \sin \varphi - (-\sin \varphi) = \sin \varphi + \sin \varphi = 2 \sin \varphi$

113. İfadəni sadələşdirin: $\sin^4 \alpha + 2 \sin^4 \alpha \cdot \operatorname{ctg}^2 \alpha + \cos^4 \alpha =$

- A) 1 B) -1 C) 0 D) $\cos 2\alpha$ E) $\sin 2\alpha$

$$\begin{aligned} &= \sin^4 \alpha + 2 \sin^4 \alpha \cdot \frac{\cos^2 \alpha}{\sin^2 \alpha} + \cos^4 \alpha = \sin^4 \alpha + 2 \sin^2 \alpha \cos^2 \alpha + \cos^4 \alpha = \\ &= (\sin^2 \alpha + \cos^2 \alpha)^2 = 1^2 = 1 \end{aligned}$$

114. Aşağıdakı funksiyalardan hansı IV rübə azalır?

- A) $\sin x$ B) $\cos x$ C) $\operatorname{tg} x$ D) $\operatorname{ctg} x$ E) heç biri

CFR

115. Aşağıdakı funksiyalardan hansı II rübə artandır?

- A) $\sin x$ B) $\cos x$ C) $\operatorname{tg} x$ D) $\operatorname{ctg} x$ E) heç biri

Təyin oblastlarında həmişə $\operatorname{tg} x$ artan, $\operatorname{ctg} x$ isə azalan funksiyalardır

116. $\cos a = 0$, $\sin b = 1$ olarsa, $b - a$ nəyə bərabərdir?

- A) $\pi k, k \in \mathbb{Z}$ B) $\frac{\pi k}{2}, k \in \mathbb{Z}$ C) $\frac{\pi}{2}(2k - 1), k \in \mathbb{Z}$

- D) $\frac{3\pi}{2}$ E) π

$\cos a = 0$ $\sin b = 1$

$a = \frac{\pi}{2} + \pi k$ $b = \frac{\pi}{2} + 2\pi k$

$b - a = \frac{\pi}{2} + 2\pi k - (\frac{\pi}{2} + \pi k) = \frac{\pi}{2} + 2\pi k - \frac{\pi}{2} - \pi k = \pi k, k \in \mathbb{Z}$

117. $\sin a = 1$ və $\cos b = 0$ olarsa, $a + b$ nəyə bərabərdir?

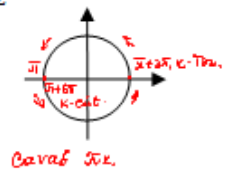
- A) $\pi k, k \in \mathbb{Z}$ B) $\frac{\pi k}{2}, k \in \mathbb{Z}$ C) $\frac{\pi}{2}(2k - 1), k \in \mathbb{Z}$

- D) $\frac{2\pi k}{3}, k \in \mathbb{Z}$ E) $\frac{\pi}{4}(2k + 1), k \in \mathbb{Z}$

$\sin a = 1$ $\cos b = 0$

$a = \frac{\pi}{2} + 2\pi k$ $b = \frac{\pi}{2} + \pi k$

$a + b = \frac{\pi}{2} + 2\pi k + \frac{\pi}{2} + \pi k = \pi + 3\pi k$



Cavab: D

118. $y = \frac{1}{4} \operatorname{ctg}^2 2x + 1$ funksiyasının ən kiçik qiymətini tapın.

- A) 1,5 B) 0,25 C) 0 D) $\frac{5}{4}$ E) 1

ctg 2x sifara bərabər ola bildiyindən $\operatorname{ctg}^2 2x$ -in ən kiçik qiyməti 0-ə bərabərdir.
 $\text{ƏKR} (y) = \frac{1}{4} \cdot 0 + 1 = 1$.

119. $\sin \alpha + \cos \alpha = \sqrt{2}$ olarsa, α bucağı hansı rübədir?

- A) I B) II C) III D) IV E) heç birinin

$$\begin{aligned} \sin \alpha + \sin(90^\circ - \alpha) &= 2 \sin \frac{\alpha + 90^\circ - \alpha}{2} \cdot \cos \frac{\alpha - (90^\circ - \alpha)}{2} = \\ &= 2 \sin 45^\circ \cdot \cos \frac{\alpha - 90^\circ + \alpha}{2} = 2 \cdot \frac{\sqrt{2}}{2} \cdot \cos \frac{2\alpha - 90^\circ}{2} = \sqrt{2} \cos \frac{2(\alpha - 45^\circ)}{2} = \\ &= \sqrt{2} \cos(\alpha - 45^\circ) = \sqrt{2} \quad \alpha - 45^\circ = 0^\circ \\ \cos(\alpha - 45^\circ) &= 1 \quad \alpha = 45^\circ \in \text{I-rüb} \end{aligned}$$

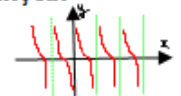
120. $y = 2 \operatorname{tg}^2 3x - 1$ funksiyasının ən kiçik qiymətini tapın.

- A) -1 B) 0 C) 1 D) $\frac{1}{2}$ E) -5

$\text{ƏKR} (y) = 2 \operatorname{tg}^2 3x - 1 = 2 \cdot 0 - 1 = 0 - 1 = -1$

121. Hansı triqonometrik funksiyanın qrafiki ordinat oxunu kəsmir?

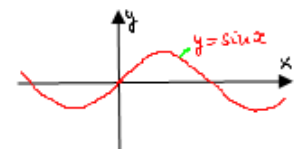
- A) $\sin x$ B) $\cos x$ C) $\operatorname{tg} x$ D) $\operatorname{ctg} x$ E) heç biri



122. Aşağıdakı triqonometrik funksiyalardan hansının qrafiki koordinat başlanğıcından keçir?

- A) $y = \sin x$ B) $y = \cos x$ C) $y = \operatorname{ctg} x$

- D) $y = \operatorname{ctg} x + 1$ E) $y = \operatorname{tg} x + 1$



TRİGONOMETRİK FONKSİYALAR

123. Hansı ifadenin işareti müsbettir?

- A) $\sin 115^\circ \cdot \cos 115^\circ = -$ B) $\sin 120^\circ \cdot \cos 220^\circ = -$
 C) $\operatorname{tg} 170^\circ \cdot \operatorname{ctg} 190^\circ = -$ D) $\cos 210^\circ \cdot \sin 310^\circ = +$
 E) $\cos 300^\circ \cdot \operatorname{tg} 300^\circ = -$

hasilin işareti vuruqların işaretlerinden asıldır. vuruqlar aynı işarete olduğunda hasil müsbət(+), müxtəlif işarete olduğunda isə mənfi (-) olur.

124. İfadelerde hansının işareti mənfidir?

- A) $\sin 135^\circ \cdot \operatorname{tg} 195^\circ = +$ B) $\cos 145^\circ \cdot \operatorname{tg} 125^\circ = +$
 C) $\operatorname{tg} 130^\circ \cdot \operatorname{ctg} 160^\circ = +$ D) $\operatorname{tg} 280^\circ \cdot \cos 300^\circ = -$
 E) $\operatorname{tg} 310^\circ \cdot \sin 220^\circ = +$

125. $D(f) = \{x \in \mathbb{R}, x \neq \frac{\pi}{2} + \pi k, k \in \mathbb{Z}\}$ hansı funksiyanın təyin oblastıdır?

- A) $\sin x$ B) $\cos x$ C) $\operatorname{tg} x$ D) $\operatorname{ctg} x$ E) $\frac{1}{\sin x}$
 $\operatorname{tg} x = \frac{\sin x}{\cos x}$ $\cos x \neq 0$
 $x \neq \frac{\pi}{2} + \pi k.$

126. $D(f) = \{x \in \mathbb{R}, x \neq \pi k, k \in \mathbb{Z}\}$ hansı funksiyanın təyin oblastıdır?

- A) $\sin x$ B) $\cos x$ C) $\operatorname{tg} x$ D) $\operatorname{ctg} x$ E) $\frac{1}{\cos x}$
 $\operatorname{ctg} x = \frac{\cos x}{\sin x}$ $\sin x \neq 0$
 $x \neq \pi k, k \in \mathbb{Z}.$

127. $\sqrt{3 + \sin^2 x} = 2$ olarsa, $\cos x$ -i tapın.

- A) 1 B) 0,5 C) 0 D) -1 E) -0,5
 $3 + \sin^2 x = 4$
 $\sin^2 x = 4 - 3 = 1$
 $\sin x = \pm 1$
 $\cos x = 0.$

128. $\sqrt{5 - \cos^2 x} = 2$ olarsa, $\sin x$ -i tapın.

- A) 0 B) 1 C) -1 D) 2 E) -2
 $5 - \cos^2 x = 4$
 $\cos^2 x = 5 - 4$
 $\cos^2 x = 1$ $\sin x = 0$
 $\cos x = \pm 1$

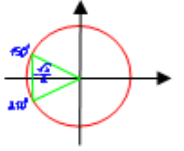
129. $\sin \alpha + \cos \alpha = -\frac{\sqrt{5}}{2}$ olduqda, α bucağının hansı rübdə yerləşdiyini tapın.

- A) I B) II C) III D) IV E) heç birinin
 $\sin \alpha + \sin(90^\circ - \alpha) = 2 \sin \frac{\alpha + 90^\circ - \alpha}{2} \cdot \cos \frac{\alpha - 90^\circ + \alpha}{2} =$
 $= 2 \sin 45^\circ \cdot \cos(\alpha - 45^\circ) = 2 \cdot \frac{\sqrt{2}}{2} \cdot \cos(\alpha - 45^\circ) = \sqrt{2} \cos(\alpha - 45^\circ) = \frac{\sqrt{5}}{2}$
 $\cos = \frac{\sqrt{5}}{2\sqrt{2}} = \frac{\sqrt{5}}{\sqrt{8}} = \sqrt{\frac{5}{8}}$

130. $\cos \alpha + \sin \alpha = -\frac{\sqrt{6}}{2}$ olduqda, α bucağının hansı rübdə yerləşdiyini tapın.

- A) I B) II C) III D) IV E) heç birinin

$\cos \alpha + \cos(90^\circ - \alpha) = 2 \cos \frac{\alpha + 90^\circ - \alpha}{2} \cdot \cos \frac{\alpha - 90^\circ + \alpha}{2} = 2 \cos 45^\circ \cos(\alpha - 45^\circ) =$
 $= 2 \cdot \frac{\sqrt{2}}{2} \cdot \cos(\alpha - 45^\circ) = \sqrt{2} \cos(\alpha - 45^\circ) = -\frac{\sqrt{6}}{2}$
 $\cos(\alpha - 45^\circ) = -\frac{\sqrt{3}}{2}$
 $\alpha - 45^\circ = 150^\circ$
 $\alpha = 150^\circ + 45^\circ = 195^\circ \in \text{III- rübd}$
 $\alpha - 45^\circ = 210^\circ$
 $\alpha = 210^\circ + 45^\circ = 255^\circ \in \text{IV- rübd}$



131. β -bucağının II rübdə yerləşdiyini bilərək, verilən ifadəni sadələşdirin: $(\sin \beta + |\sin \beta|)(\cos \beta + |\cos \beta|) =$

- A) $2 \sin 2\beta$ B) $-2 \sin 2\beta$ C) $\cos 2\beta$ D) 1 E) 0

$\alpha \in \text{II}$ $\sin \alpha > 0$ $\cos \alpha < 0$ olur. $= (\sin \beta + \sin \beta) \cdot (\cos \beta - \cos \beta) =$
 $|\sin \alpha| = \sin \alpha$ $= 2 \sin \beta \cdot 0 = 0$
 $|\cos \alpha| = -\cos \alpha$

132. β -bucağının IV rübdə yerləşdiyini bilərək, ifadəni sadələşdirin:

$(\sin \beta + |\sin \beta|)(\cos \beta + |\cos \beta|) = (\sin \beta - \sin \beta) (\cos \beta + \cos \beta) =$
 A) 4 B) -4 C) $\operatorname{tg}^2 \beta - \operatorname{ctg}^2 \beta$ D) 0 E) 1

$\beta \in \text{IV}, \sin \beta < 0$ $|\sin \beta| = -\sin \beta$ $= 0$ $2 \cos \beta = 0.$
 $\cos \beta > 0$ $|\cos \beta| = \cos \beta$

133. İfadəni sadələşdirin: $\frac{\cos^2 \alpha - \sin^2 \alpha}{1 + \sin \alpha \cos \alpha} = \frac{(\cos \alpha - \sin \alpha)(\cos \alpha + \sin \alpha)}{-2 \sin \alpha \cos \alpha + \cos^2 \alpha + \sin^2 \alpha} =$

- A) $\cos \alpha + \sin \alpha$ B) $\cos \alpha$ C) $\cos^2 \alpha - \sin^2 \alpha$
 D) $\cos \alpha - \sin \alpha$ E) 1 $= \cos \alpha - \sin \alpha$

134. Hesablayın: $2 \arccos(-1) - \frac{1}{3} \arccos \frac{\sqrt{2}}{2} + 2 \arccos 0 =$

- A) $\frac{2\pi}{3}$ B) $\frac{4\pi}{12}$ C) $\frac{35\pi}{12}$ D) $-\frac{23\pi}{12}$ E) $-\frac{\pi}{12}$

$= 2 \cdot \pi - \frac{1}{3} \cdot \frac{\pi}{4} + 2 \cdot \frac{\pi}{2} = 2\pi - \frac{\pi}{12} + \pi = 3\pi - \frac{\pi}{12} = \frac{36\pi - \pi}{12} = \frac{35\pi}{12}$

135. Hansı bərabərlik səhvdir:

1. $\sin^2 x + \cos^2 x = 1; +$ 2. $\sin(\frac{\pi}{2} - x) = \cos x; +$
 3. $\cos(\frac{\pi}{2} - x) = \sin x; +$ 4. $\sin(\frac{\pi}{2} + x) = \cos x; +$
 5. $\cos(\frac{\pi}{2} + x) = \sin x; -$
 A) 1 B) 2 C) 3 D) 4 E) 5

$\cos(\frac{\pi}{2} + x) = -\sin x$ doğrudur.

136. Aşağıdakılardan $\cos \alpha$ -ya bərabər olan hansıdır?

- A) $\sin(180^\circ - \alpha)$ B) $\cos(180^\circ - \alpha)$ C) $\cos(90^\circ + \alpha)$
 D) $\cos(-\alpha)$ E) $\sin(-\alpha)$

- A) $\sin(180^\circ - \alpha) = \sin \alpha$ D) $\cos(-\alpha) = \cos \alpha$
 B) $\cos(180^\circ - \alpha) = -\cos \alpha$ E) $\sin(-\alpha) = -\sin \alpha$
 C) $\cos(90^\circ + \alpha) = -\sin \alpha$

137. Aşağıdakı ifadələrdən $-\operatorname{tg} \alpha$ -ya bərabər olan hansıdır?

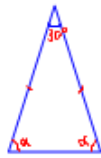
- A) $\operatorname{tg}(90^\circ - \alpha)$ B) $\operatorname{tg}(90^\circ + \alpha)$ C) $\operatorname{ctg}(90^\circ + \alpha)$
 D) $\operatorname{ctg}(180^\circ - \alpha)$ E) $\operatorname{ctg}(90^\circ - \alpha)$

- A) $\operatorname{tg}(90^\circ - \alpha) = \operatorname{ctg} \alpha$ D) $\operatorname{ctg}(180^\circ - \alpha) = -\operatorname{ctg} \alpha$
 B) $\operatorname{tg}(90^\circ + \alpha) = -\operatorname{ctg} \alpha$ E) $\operatorname{ctg}(90^\circ - \alpha) = \operatorname{tg} \alpha$
 C) $\operatorname{ctg}(90^\circ + \alpha) = -\operatorname{tg} \alpha$

138. Bərabəryanlı üçbucağın tənə bucağı β üçün $\operatorname{tg} \beta = \frac{1}{\sqrt{3}}$ -dür.

- Oturacağı bitişik bucağı tapın.
 A) 45° B) 60° C) 65° D) 70° E) 75°

$\operatorname{tg} \beta = \frac{1 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{\sqrt{3}}{3}$
 $\beta = 30^\circ$



$\alpha = (180^\circ - 30^\circ) : 2 = 150^\circ : 2 = 75^\circ$

139. $\sin \alpha$ verilənlərdən hansına bərabər ola bilər?

- A) $\frac{\pi}{4}$ B) $\sqrt{3} - 2$ C) $\frac{\sqrt{5}}{2}$ D) $-\frac{\sqrt{e}}{4}$ E) $\frac{1}{7}$

- $-1 \leq \sin \alpha \leq 1$
 A) $\frac{\pi}{4} \approx \frac{3.14}{4} \approx 0,78 \in [-1, 1]$ D) $-\frac{\sqrt{e}}{4} \approx -\frac{1.7}{4} \approx -0,425$
 B) $\sqrt{3} - 2 \approx 1,7 - 2 = -0,3 \in [-1, 1]$ E) $\frac{1}{7} \in [-1, 1]$
 C) $\frac{\sqrt{5}}{2} \approx \frac{2,2}{2} = 1,1 \notin [-1, 1]$

140. Bərabəryanlı üçbucağın oturacağı bitişik bucağı β -dir və

- $\cos \beta = \frac{\sqrt{3}}{2}$. Tənədəki bucağı tapın.
 A) 120° B) 90° C) 150° D) 60° E) 135°

$\cos \beta = \frac{\sqrt{3}}{2}$
 $\beta = 30^\circ$

$\alpha = 180^\circ - 2 \cdot 30^\circ = 120^\circ$
 $\alpha = 120^\circ$



141. $\cos \alpha$ verilən ədədlərdən hansına bərabər ola bilər?

- A) $\frac{\sqrt{7}}{3}$ B) $\frac{\pi}{3}$ C) $\sqrt{5} - 2$ D) $\frac{1}{\sqrt{8}}$ E) $\frac{1}{8}$

- $-1 \leq \cos \alpha \leq 1$
 A) $\frac{\sqrt{7}}{3} \approx \frac{2,6}{3} \approx 0,9 \in [-1, 1]$ E) $\frac{1}{8} = 0,125 \in [-1, 1]$
 B) $\frac{\pi}{3} \approx \frac{3,14}{3} \approx 1,05 \notin [-1, 1]$
 C) $\sqrt{5} - 2 \approx 2,2 - 2 = 0,2 \in [-1, 1]$
 D) $\frac{1}{\sqrt{8}} \approx \frac{1}{2,8} \approx 0,36 \in [-1, 1]$

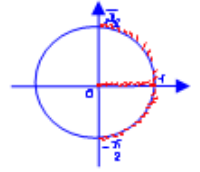
142. $y = 5 \cos^2 x - 2$ funksiyasının qiymətler oblastını tapın.

- A) $[-7; 3]$ B) $[-3; 2]$ C) $[-2; 3]$ D) $[0; 1]$ E) $[-1; 2]$

$\cos^2 x \in [0; 1]$
 $5 \cdot 0 - 2 = -2$
 $5 \cdot 1 - 2 = 3$
 $5 \cos^2 x - 2 \in [-2; 3]$

143. x -in hansı qiymətlərində $\sqrt{\cos x}$ ifadəsinin mənası var?

- A) $-\frac{\pi}{2} + 2\pi n \leq x \leq \frac{\pi}{2} + 2\pi n, n \in \mathbb{Z}$
 B) $\frac{3\pi}{2} + 2\pi n < x < \frac{5\pi}{2} + 2\pi n, n \in \mathbb{Z}$
 C) $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$
 D) $\frac{\pi}{2} < x < \frac{3\pi}{2}$
 E) $\frac{\pi}{2} + 2\pi n \leq x \leq \frac{3\pi}{2} + 2\pi n, n \in \mathbb{Z}$



$\sqrt{\cos x}$ - ifadəsinin mənasının olması üçün $\cos x \geq 0$ olmalıdır.
 $\cos x \geq 0$
 $-\frac{\pi}{2} + 2\pi n \leq x \leq \frac{\pi}{2} + 2\pi n$

144. $y = \cos^2 2x$ funksiyasının ən kiçik müsbət dövrünü tapın.

- A) π B) 2π C) 4π D) $\frac{\pi}{2}$ E) $\frac{\pi}{4}$
 $y = \cos^2 2x = \frac{1 + \cos 4x}{2} = \frac{1}{2}(1 + \cos 4x)$ $T = \frac{2\pi}{4} = \frac{\pi}{2}$

145. Funksiyanın qiymətler oblastını tapın: $y = 3 \sin^2 x + 2$

- A) $[2; 5]$ B) $[0; 2]$ C) $[2; 3]$ D) $[-1; 5]$ E) $[0; 5]$

$0 \leq \sin^2 x \leq 1$ $\sin^2 x \in [0; 1]$ $y = 3 \cdot 0 + 2 = 2$
 $y = 3 \cdot 1 + 2 = 5$ $[2; 5]$

146. Funksiyanın qiymətler oblastını tapın: $y = \sin^4 x + \cos^4 x$

- A) $[0; 1]$ B) $[0; \frac{1}{2}]$ C) $[\frac{1}{2}; 1]$ D) $[\frac{1}{2}; \frac{3}{4}]$ E) $[\frac{3}{4}; 1]$

$y = (\sin^2 x + \cos^2 x)^2 - 2 \sin^2 x \cos^2 x =$
 $= (\sin^2 x + \cos^2 x)^2 - \frac{1}{2} \cdot 4 \sin^2 x \cos^2 x = 1 - \frac{1}{2} (2 \sin x \cos x)^2 =$
 $= 1 - \frac{1}{2} \sin^2 2x$ $y = 1 - \frac{1}{2} \sin^2 2x$
 $0 \leq \sin^2 2x \leq 1$ $1 - \frac{1}{2} \cdot 0^2 = 1 - 0 = 1$
 $\sin^2 2x \in [0; 1]$ $1 - \frac{1}{2} \cdot 1^2 = 1 - \frac{1}{2} = \frac{1}{2}$ $[\frac{1}{2}; 1]$

147. Funksiyanın qiymətler oblastını tapın: $y = \cos^2 x - \cos x$

- A) $[-1; 1]$ B) $[-1; 0]$ C) $[0; 1]$ D) $[0; 2]$ E) $[-\frac{1}{4}; 2]$

$y = (\cos^2 x - \cos x)^2 - (\frac{1}{2})^2 = (\cos x - \frac{1}{2})^2 - \frac{1}{4}$
 $\text{B} \text{R} (y) \cos x = \frac{1}{2} \text{ olduqda } (\frac{1}{2} - \frac{1}{2})^2 - \frac{1}{4} = 0^2 - \frac{1}{4} = -\frac{1}{4}$
 $\text{B} \text{R} (y) \cos x = -1 \text{ olduqda } (-1 - \frac{1}{2})^2 - \frac{1}{4} = (-\frac{3}{2})^2 - \frac{1}{4} = \frac{9}{4} - \frac{1}{4} = \frac{8}{4} = 2$
 $[-\frac{1}{4}; 2]$

148. $\cos \alpha = \cos \beta$ olarsa, α və β arasında hansı münasibət hökmən doğrudur?

- A) $\alpha = \beta$ və ya $\alpha = -\beta$
 B) $\alpha = \beta + 2\pi k$
 C) $\alpha + \beta = 2\pi k$ və ya $\alpha - \beta = 2\pi k$
 D) $\alpha + \beta = \pi k$ və ya $\alpha - \beta = \pi k$
 E) $\alpha + \beta = k$ və ya $\alpha - \beta = k$

$\cos \alpha = \cos \beta$
 $\cos \alpha - \cos \beta = 0$
 $-2 \sin \frac{\alpha + \beta}{2} \cdot \sin \frac{\alpha - \beta}{2} = 0$
 $\sin \frac{\alpha + \beta}{2} = 0$ $\sin \frac{\alpha - \beta}{2} = 0$
 $\frac{\alpha + \beta}{2} = \pi k$ $\frac{\alpha - \beta}{2} = \pi k$
 $\alpha + \beta = 2\pi k$ $\alpha - \beta = 2\pi k$

$$\frac{\pi}{2} - \frac{3\pi}{8} = \frac{4\pi - 3\pi}{8} = \frac{\pi}{8} \Rightarrow \frac{3\pi}{8} = \frac{\pi}{2} - \frac{\pi}{8}$$

149. Hesablayın $\frac{6 \operatorname{ctg} 240^\circ}{\cos 210^\circ + \sin 240^\circ} = \frac{6 \operatorname{ctg}(180^\circ + 60^\circ)}{\cos(180^\circ + 20^\circ) + \sin(180^\circ + 60^\circ)} =$
 A) $\sqrt{3}$ B) 1,5 C) -1 D) -2 E) -2,5

$$= \frac{6 \operatorname{ctg} 60^\circ}{-\cos 30^\circ + (-\sin 60^\circ)} = \frac{6 \cdot \frac{\sqrt{3}}{3}}{-\frac{\sqrt{3}}{2} + (-\frac{\sqrt{3}}{2})} = \frac{2\sqrt{3}}{-\sqrt{3}} = -2$$

150. Hesablayın $\frac{1}{2} \operatorname{tg}(-870^\circ) \cdot \cos 330^\circ = -\frac{1}{2} \operatorname{tg} 870^\circ \cdot \cos 330^\circ =$
 A) $\frac{1}{2}$ B) $-\frac{1}{4}$ C) $\frac{1}{4}$ D) 1 E) $-\frac{1}{2}$

$$= -\frac{1}{2} \operatorname{tg}(2 \cdot 360^\circ + 150^\circ) \cdot \cos(360^\circ - 30^\circ) = -\frac{1}{2} \operatorname{tg} 150^\circ \cdot \cos 30^\circ =$$

$$= -\frac{1}{2} \operatorname{tg}(180^\circ - 30^\circ) \cdot \frac{\sqrt{3}}{2} = -\frac{\sqrt{3}}{4} \cdot (-\operatorname{tg} 30^\circ) = \frac{\sqrt{3}}{4} \cdot \frac{\sqrt{3}}{3} = \frac{3}{12} = \frac{1}{4}$$

151. Hesablayın $\sin^2 17^\circ + \sin^2 45^\circ + \sin^2 73^\circ =$
 A) 1,5 B) 0,5 C) 1 D) 0 E) 2,5

$$= \sin^2 17^\circ + \left(\frac{\sqrt{2}}{2}\right)^2 + \sin^2(90^\circ - 17^\circ) = \sin^2 17^\circ + \frac{1}{2} + \cos^2 17^\circ =$$

$$= 1 + \frac{1}{2} = 1\frac{1}{2} = 1,5$$

152. Hesablayın $4 \sin 105^\circ \cdot \cos 75^\circ = 4 \sin(90^\circ + 15^\circ) \cos(90^\circ - 15^\circ) =$
 A) $\frac{1}{2}$ B) 2 C) 1 D) 4 E) -1

$$= 4 \cdot \cos 15^\circ \cdot \sin 15^\circ = 2 \cdot 2 \sin 15^\circ \cdot \cos 15^\circ = 2 \sin 2 \cdot 15^\circ = 2 \sin 30^\circ = 2 \cdot \frac{1}{2} = 1$$

153. $\operatorname{tg} \alpha = 2$ olduğunda $\frac{3 \sin^2 \alpha + 2}{4 + 5 \cos^2 \alpha}$ ifadesini hesaplayın.
 A) $\frac{16}{25}$ B) $\frac{9}{25}$ C) $\frac{22}{25}$ D) $\frac{4}{5}$ E) $\frac{22}{5}$

$$\frac{3 \sin^2 \alpha + 2}{4 + 5 \cos^2 \alpha} = \frac{3 \sin^2 \alpha + 2(\sin^2 \alpha + \cos^2 \alpha)}{4(\sin^2 \alpha + \cos^2 \alpha) + 5 \cos^2 \alpha} = \frac{3 \sin^2 \alpha + 2 \sin^2 \alpha + 2 \cos^2 \alpha}{4 \sin^2 \alpha + 4 \cos^2 \alpha + 5 \cos^2 \alpha} =$$

$$= \frac{5 \sin^2 \alpha + 2 \cos^2 \alpha}{4 \sin^2 \alpha + 9 \cos^2 \alpha} = \frac{5 \frac{\sin^2 \alpha}{\cos^2 \alpha} + 2}{4 \frac{\sin^2 \alpha}{\cos^2 \alpha} + 9} = \frac{5 \operatorname{tg}^2 \alpha + 2}{4 \operatorname{tg}^2 \alpha + 9} = \frac{5 \cdot 2^2 + 2}{4 \cdot 2^2 + 9} =$$

$$= \frac{22}{25}$$

154. $y = \sqrt{5 - \cos x}$ fonksiyasının değerler aralığını bulun.
 A) $[0; 1]$ B) $[4; 6]$ C) $[2; \sqrt{6}]$ D) $[\sqrt{2}; 6]$ E) $[\sqrt{2}; \infty)$

$-1 \leq \cos x \leq 1$ $\sqrt{5 - (-1)} = \sqrt{5 + 1} = \sqrt{6}$
 $\cos x \in [-1; 1]$ $\sqrt{5 - 1} = \sqrt{4} = 2$
 $[2; \sqrt{6}]$

155. $y = \sqrt{5 - \sin x}$ fonksiyasının değerler aralığını bulun.
 A) $(2; \sqrt{6})$ B) $[2; \sqrt{6}]$ C) $[4; 6]$ D) $[\sqrt{6}; 6]$ E) $[1; \sqrt{6}]$

$-1 \leq \sin x \leq 1$ $\sqrt{5 - (-1)} = \sqrt{5 + 1} = \sqrt{6}$
 $\sin x \in [-1; 1]$ $\sqrt{5 - 1} = \sqrt{4} = 2$
 $[2; \sqrt{6}]$

156. Hesablayın $(1 + \operatorname{tg}^2 \frac{\pi}{8}) \cdot (1 + \operatorname{tg}^2 \frac{3\pi}{8}) =$
 A) 8 B) 2 C) $\sqrt{2}$ D) 4 E) $2\sqrt{2}$

$$= (1 + \operatorname{tg}^2 \frac{\pi}{8}) \cdot (1 + \operatorname{tg}^2 (\frac{\pi}{2} - \frac{\pi}{8})) = (1 + \operatorname{tg}^2 \frac{\pi}{8}) \cdot (1 + \operatorname{ctg}^2 \frac{\pi}{8}) =$$

$$= \frac{1}{\cos^2 \frac{\pi}{8}} \cdot \frac{1}{\sin^2 \frac{\pi}{8}} = \frac{1}{4 \sin^2 \frac{\pi}{8} \cdot \cos^2 \frac{\pi}{8}} = \frac{4}{(\sin 2 \cdot \frac{\pi}{8})^2} = \frac{4}{(\sin \frac{\pi}{4})^2} = \frac{4}{(\frac{\sqrt{2}}{2})^2} = \frac{4}{\frac{2}{2}} = \frac{4}{1} = 4$$

157. Hesablayın $8 \cos 105^\circ \sin 165^\circ = 8 \cos(90^\circ + 15^\circ) \sin(180^\circ - 15^\circ) =$
 A) $2\sqrt{3} - 4$ B) $4 - 2\sqrt{3}$ C) $4 + 2\sqrt{3}$ D) -2 E) 2

$$= 8(-\sin 15^\circ) \cdot \sin 15^\circ = -8 \sin^2 15^\circ = -8 \cdot \frac{1 - \cos 30^\circ}{2} =$$

$$= -4(1 - \frac{\sqrt{3}}{2}) = -4 + 2\sqrt{3} = 2\sqrt{3} - 4$$

$$8 \sin 165^\circ \cos 105^\circ = 8 \cdot \frac{1}{2} (\sin(165^\circ + 105^\circ) + \sin(165^\circ - 105^\circ)) = 4(\sin 270^\circ + \sin 60^\circ) =$$

$$= 4 \cdot (-1 + \frac{\sqrt{3}}{2}) = -4 + 2\sqrt{3} = 2\sqrt{3} - 4$$

158. $\operatorname{ctg} \alpha = 3$ olduğunda $\frac{2 \cos^2 \alpha + 3}{5 + 3 \cos^2 \alpha}$ ifadesinin değerini bulun.
 A) $\frac{48}{77}$ B) 1 C) $\frac{26}{77}$ D) $\frac{43}{77}$ E) $\frac{51}{77}$

$$= \frac{2 \cos^2 \alpha + 3 \cos^2 \alpha + 3 \sin^2 \alpha}{5 \sin^2 \alpha + 5 \cos^2 \alpha + 3 \cos^2 \alpha} = \frac{5 \cos^2 \alpha + 3 \sin^2 \alpha}{5 \sin^2 \alpha + 8 \cos^2 \alpha} = \frac{\frac{5 \cos^2 \alpha}{\sin^2 \alpha} + 3}{5 + \frac{8 \cos^2 \alpha}{\sin^2 \alpha}} =$$

$$= \frac{5 \operatorname{ctg}^2 \alpha + 3}{5 + 8 \operatorname{ctg}^2 \alpha} = \frac{5 \cdot 3^2 + 3}{5 + 8 \cdot 3^2} = \frac{48}{77}$$

159. Hesablayın $(1 + \operatorname{ctg}^2 \frac{\pi}{8})(1 + \operatorname{ctg}^2 \frac{3\pi}{8}) = (1 + \operatorname{ctg}^2 \frac{\pi}{8})(1 + \operatorname{tg}^2 \frac{\pi}{8}) =$
 A) 8 B) 4 C) 2 D) 16 E) 6

$$\frac{\pi}{2} - \frac{3\pi}{8} = \frac{4\pi - 3\pi}{8} = \frac{\pi}{8} \Rightarrow \frac{3\pi}{8} = \frac{\pi}{2} - \frac{\pi}{8}$$

$$\operatorname{ctg} \frac{3\pi}{8} = \operatorname{ctg}(\frac{\pi}{2} - \frac{\pi}{8}) = \operatorname{tg} \frac{\pi}{8}$$

$$= \frac{1}{\sin^2 \frac{\pi}{8}} \cdot \frac{1}{\cos^2 \frac{\pi}{8}} = \frac{1}{4 \sin^2 \frac{\pi}{8} \cdot \cos^2 \frac{\pi}{8}} = \frac{4}{(\sin 2 \cdot \frac{\pi}{8})^2} = \frac{4}{(\sin \frac{\pi}{4})^2} = \frac{4}{(\frac{\sqrt{2}}{2})^2} = \frac{4}{\frac{2}{2}} = 4$$

160. Sadələşdirin: $\operatorname{tg}^2(\frac{\pi}{2} - \alpha) + \sin^2(\pi - \alpha) + \sin^2(\frac{3\pi}{2} + \alpha) =$
 A) $\sin^2 \alpha$ B) $\cos^2 \alpha$ C) $\operatorname{ctg}^2 \alpha$ D) $\frac{1}{\sin^2 \alpha}$ E) $\frac{1}{\cos^2 \alpha}$

$$= \operatorname{ctg}^2 \alpha + \sin^2 \alpha + \cos^2 \alpha = \operatorname{ctg}^2 \alpha + 1 = \frac{1}{\sin^2 \alpha}$$

161. İfadəni hesablayın: $\cos \frac{\pi}{7} \cdot \cos \frac{4\pi}{7} \cdot \cos \frac{5\pi}{7} =$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{8}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{3}}{4}$

$$= \frac{2 \sin \frac{\pi}{7} \cos \frac{\pi}{7} \cos \frac{4\pi}{7} \cdot \cos \frac{5\pi}{7}}{2 \sin \frac{\pi}{7}} = \frac{\sin \frac{2\pi}{7} \cos \frac{4\pi}{7} \cos \frac{5\pi}{7}}{2 \sin \frac{\pi}{7}}$$

$$= \frac{2 \sin \frac{2\pi}{7} \cdot (-\cos \frac{2\pi}{7}) \cdot \cos \frac{4\pi}{7}}{2 \cdot 2 \sin \frac{\pi}{7}} = \frac{-2 \sin \frac{4\pi}{7} \cos \frac{4\pi}{7}}{4 \sin \frac{\pi}{7}} = \frac{-\sin \frac{8\pi}{7}}{8 \sin \frac{\pi}{7}} =$$

$$= \frac{-\sin(\pi + \frac{\pi}{7})}{8 \sin \frac{\pi}{7}} = \frac{\sin \frac{\pi}{7}}{8 \sin \frac{\pi}{7}} = \frac{1}{8}$$

162. Hesablayın $\operatorname{tg} 1^\circ - \operatorname{ctg} 1^\circ + \operatorname{tg} 2^\circ - \operatorname{ctg} 2^\circ + \dots + \operatorname{tg} 89^\circ - \operatorname{ctg} 89^\circ =$
 A) 1 B) -1 C) $+\infty$ D) $-\infty$ E) 0

$$= \operatorname{tg} 1^\circ - \operatorname{ctg} 1^\circ + \operatorname{tg} 2^\circ - \operatorname{ctg} 2^\circ + \dots +$$

TRİQONOMETRİK FUNKSİYALAR

$\sin(90^\circ - \alpha) = \cos \alpha$

$\cos(90^\circ - \alpha) = \sin \alpha$ düsturlarından istifadə etsək

163. Hesablayın: $\sin 1^\circ - \cos 1^\circ + \sin 2^\circ - \cos 2^\circ + \sin 3^\circ - \cos 3^\circ + \dots$

$\dots + \sin 89^\circ - \cos 89^\circ + \sin 90^\circ =$

- (A) 1 B) -1 C) 0 D) $\frac{1}{2}$ E) $-\frac{1}{2}$

$= \sin 1^\circ - \cos 1^\circ + \sin 2^\circ - \cos 2^\circ + \sin 3^\circ - \cos 3^\circ + \dots + \cos 1^\circ - \sin 1^\circ + 1 = 1$

164. Sadələşdirin: $\operatorname{ctg}^2\left(\frac{\pi}{2} + \alpha\right) + \cos^2(\pi + \alpha) + \cos^2\left(\frac{3\pi}{2} - \alpha\right) =$

- (A) $\frac{1}{\cos^2 \alpha}$ B) $\cos^2 \alpha$ C) 1 D) $\operatorname{tg}^2 \alpha$ E) $\sin^2 \alpha$

$= \operatorname{tg}^2 \alpha + \cos^2 \alpha + \sin^2 \alpha = \operatorname{tg}^2 \alpha + 1 = \frac{1}{\cos^2 \alpha}$

165. İfadəni hesablayın: $\cos \frac{2\pi}{7} \cdot \cos \frac{4\pi}{7} \cdot \cos \frac{8\pi}{7} =$

- (A) $\frac{1}{8}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$ D) 0,4 E) 0,8

$= \frac{2 \sin \frac{2\pi}{7} \cdot \cos \frac{2\pi}{7} \cdot \cos \frac{4\pi}{7} \cdot \cos \frac{8\pi}{7}}{2 \sin \frac{2\pi}{7}} = \frac{2 \sin \frac{4\pi}{7} \cdot \cos \frac{4\pi}{7} \cdot \cos \frac{8\pi}{7}}{2 \sin \frac{2\pi}{7}} = \frac{2 \sin \frac{8\pi}{7} \cdot \cos \frac{8\pi}{7}}{8 \sin \frac{2\pi}{7}} = \frac{\sin \frac{16\pi}{7}}{8 \sin \frac{2\pi}{7}} = \frac{\sin \left(2\pi + \frac{2\pi}{7}\right)}{8 \sin \frac{2\pi}{7}} = \frac{\sin \frac{2\pi}{7}}{8 \sin \frac{2\pi}{7}} = \frac{1}{8}$

166. Hesablayın: $\operatorname{tg} 15^\circ (1 + \sin 60^\circ) =$

- (A) 0,5 B) 1 C) 0 D) -1 E) -0,5

$= \sqrt{\frac{1 - \cos 30^\circ}{1 + \cos 30^\circ}} \left(1 + \frac{\sqrt{3}}{2}\right) = \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}}} \cdot \frac{2 + \sqrt{3}}{2} = \sqrt{\frac{2 - \sqrt{3}}{2 + \sqrt{3}}} \cdot \frac{2 + \sqrt{3}}{2} = \frac{2 - \sqrt{3}}{2 + \sqrt{3}} (2 + \sqrt{3})^2 \cdot \frac{1}{2} = \frac{1}{2} \sqrt{4 - 3} = \frac{1}{2} \cdot 1 = \frac{1}{2} = 0,5$

167. Hesablayın: $\frac{\cos 78^\circ \cdot \cos 18^\circ + \cos 12^\circ \cdot \cos 42^\circ}{\cos 57^\circ \cdot \cos 27^\circ + \cos 33^\circ \cdot \cos 63^\circ} = \frac{\sin 11^\circ \cos 13^\circ + \cos 11^\circ \sin 13^\circ}{\sin 33^\circ \cos 57^\circ + \cos 33^\circ \sin 57^\circ} =$

- A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{3}}{3}$ D) $\frac{2}{\sqrt{3}}$ E) $\sqrt{3}$

$= \frac{\sin(12^\circ + 18^\circ)}{\sin(33^\circ + 24^\circ)} = \frac{\sin 30^\circ}{\sin 60^\circ} = \frac{\sin 30^\circ}{\cos 30^\circ} = \operatorname{tg} 30^\circ = \frac{\sqrt{3}}{3}$

168. İfadəni sadələşdirin: $\frac{1 - \cos \alpha + \cos 2\alpha}{\sin 2\alpha - \sin \alpha} = \frac{1 - \cos \alpha + \cos^2 \alpha - \sin^2 \alpha}{2 \sin \alpha \cos \alpha - \sin \alpha} =$

- A) $2 \sin \alpha$ B) $\operatorname{ctg} \alpha$ C) $\operatorname{tg} \alpha$ D) $\cos \alpha - 1$ E) $\cos 2\alpha$

$= \frac{\cos^2 \alpha + \cos^2 \alpha - \cos \alpha}{\sin \alpha (2 \cos \alpha - 1)} = \frac{2 \cos^2 \alpha - \cos \alpha}{\sin \alpha (2 \cos \alpha - 1)} = \frac{\cos \alpha (2 \cos \alpha - 1)}{\sin \alpha (2 \cos \alpha - 1)} = \operatorname{ctg} \alpha$

169. Hesablayın: $\operatorname{ctg} 15^\circ \cdot (1 - \sin 60^\circ) =$

- (A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $2 - \sqrt{3}$ D) $\frac{2 - \sqrt{3}}{2}$ E) $\sqrt{3}$

$= \sqrt{\frac{1 + \cos 30^\circ}{1 - \cos 30^\circ}} \cdot \left(1 - \frac{\sqrt{3}}{2}\right) = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{1 - \frac{\sqrt{3}}{2}}} \cdot \frac{2 - \sqrt{3}}{2} = \sqrt{\frac{2 + \sqrt{3}}{2 - \sqrt{3}}} \cdot \frac{2 - \sqrt{3}}{2} = \frac{-1}{2} \sqrt{\frac{(2 + \sqrt{3})(2 - \sqrt{3})}{2 - \sqrt{3}}} = \frac{-1}{2} \sqrt{(2 + \sqrt{3})(2 - \sqrt{3})} = \frac{1}{2} \sqrt{4 - 3} = \frac{1}{2}$

170. Hesablayın:

$\arcsin\left(-\frac{1}{2}\right) + \arccos\left(-\frac{\sqrt{2}}{2}\right) - \operatorname{arctg}(-1) - \operatorname{arctg}(-\sqrt{3}) =$

- (A) $\frac{7\pi}{6}$ B) $-\frac{\pi}{6}$ C) 0 D) $\frac{\pi}{2}$ E) $\frac{\pi}{4}$

$= -\arccos \frac{1}{2} + (\pi - \arccos \frac{\sqrt{2}}{2}) + \operatorname{arctg} 1 + \operatorname{arctg} \sqrt{3} =$
 $= -30^\circ + (180^\circ - 45^\circ) + 45^\circ + 60^\circ = -30^\circ + 180^\circ - 45^\circ + 45^\circ + 60^\circ = 210^\circ =$
 $= 210 \cdot \frac{\pi}{180} = \frac{7\pi}{6}$

$\operatorname{ctg}(90^\circ - \alpha) = \operatorname{tg} \alpha$ çevirmə düsturundan istifadə etsək

171. Hesablayın: $\operatorname{ctg} 1^\circ \cdot \operatorname{ctg} 3^\circ \cdot \operatorname{ctg} 5^\circ \cdot \dots \cdot \operatorname{ctg} 89^\circ =$

- A) -1 B) 0 C) 1 D) $-\frac{1}{2}$ E) $\frac{1}{2}$

$= \operatorname{ctg} 1^\circ \operatorname{ctg} 89^\circ \cdot \operatorname{ctg} 3^\circ \operatorname{ctg} 87^\circ \cdot \operatorname{ctg} 5^\circ \operatorname{ctg} 85^\circ \dots \operatorname{ctg} 43^\circ \operatorname{ctg} 47^\circ \operatorname{ctg} 45^\circ =$
 $= (\operatorname{ctg} 1^\circ \operatorname{tg} 1^\circ) \cdot (\operatorname{ctg} 3^\circ \operatorname{tg} 3^\circ) \cdot (\operatorname{ctg} 5^\circ \operatorname{tg} 5^\circ) \dots (\operatorname{ctg} 43^\circ \operatorname{tg} 43^\circ) \operatorname{ctg} 45^\circ =$
 $= 1 \cdot 1 \cdot 1 \dots 1 \cdot 1 = 1$

$\operatorname{tg}(90^\circ - \alpha) = \operatorname{ctg} \alpha$

172. Hesablayın: $\operatorname{tg} 1^\circ \cdot \operatorname{tg} 2^\circ \cdot \dots \cdot \operatorname{tg} 88^\circ \cdot \operatorname{tg} 89^\circ = 1$

- A) 0 B) 1 C) 89 D) 90 E) 45

$\operatorname{tg} 1^\circ \operatorname{tg} 2^\circ \dots \operatorname{ctg} 2^\circ \operatorname{ctg} 1^\circ = 1$
 $\operatorname{tg} 45^\circ = 1$

173. Hesablayın:

$\arccos\left(\frac{\sqrt{3}}{2}\right) - \arcsin\left(-\frac{1}{2}\right) + \operatorname{arctg}(-\sqrt{3}) - \operatorname{arctg}(-1) =$

- A) $-\frac{3\pi}{4}$ B) $-\frac{\pi}{4}$ C) $\frac{\pi}{4}$ D) $\frac{3\pi}{4}$ E) $\frac{\pi}{12}$

$= \arccos \frac{\sqrt{3}}{2} + \arcsin \frac{1}{2} - \operatorname{arctg} \sqrt{3} + \operatorname{arctg} 1 =$
 $= 30^\circ + 30^\circ - 60^\circ + 45^\circ = 45^\circ = \frac{\pi}{4}$

174. Hesablayın: $\frac{3\sqrt{2} \sin 315^\circ + \cos 60^\circ}{\operatorname{tg} 45^\circ - \sin 90^\circ} = \frac{3\sqrt{2} \sin(360^\circ - 45^\circ) + \frac{1}{2}}{1 - \frac{1}{2}} =$


- A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $2\sqrt{2}$ D) $-\frac{\sqrt{2}}{2}$ E) -5

$= \frac{3\sqrt{2} (-\sin 45^\circ) + \frac{1}{2}}{\frac{1}{2}} = \frac{-3\sqrt{2} \cdot \frac{1}{\sqrt{2}} + \frac{1}{2}}{\frac{1}{2}} = (-3 + \frac{1}{2}) \cdot 2 = \frac{-6 + 1}{2} \cdot 2 = -5$

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175. $\operatorname{tg} \alpha = -\frac{15}{8}$ və $270^\circ < \alpha < 360^\circ$ olduqda $5 + \frac{17}{16} \cos \alpha$ -ni tapın
 A) 5,8 B) 5,5 C) 4 D) 4,5 E) 5

$\alpha \in \text{IV}^{\text{ü}} \cos \alpha > 0$
 $c = \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17$
 $\cos \alpha = \frac{8}{17}$
 $5 + \frac{17}{16} \cos \alpha = 5 + \frac{17}{16} \cdot \frac{8}{17} = 5 + \frac{1}{2} = 5,5$




176. Hesablayın: $\frac{\sqrt{2} \sin 405^\circ + \sin 60^\circ}{\operatorname{ctg} 45^\circ + \cos 30^\circ} = \frac{\sqrt{2} \sin(360^\circ + 45^\circ) + \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}} =$
 A) 1 B) $\frac{1}{2}$ C) $\sqrt{2}$ D) $\frac{1+\sqrt{3}}{2}$ E) $\frac{\sqrt{3}}{2}$

$= \frac{\sqrt{2} \sin 45^\circ + \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}} = \frac{\sqrt{2} \cdot \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}} = \frac{1 + \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}} = 1$

177. $\operatorname{ctg} \alpha = -\frac{8}{15}$ və $\frac{\pi}{2} < \alpha < \pi$ olduğunu bilərək, $(2 - \frac{17}{8} \sin \alpha)$ -ni tapın

A) $\frac{1}{8}$ B) 1 C) $\frac{15}{8}$ D) $\frac{15}{17}$ E) 8
 $\alpha \in \text{II}^{\text{ü}} \sin \alpha > 0$
 $c = \sqrt{15^2 + 8^2} = \sqrt{225 + 64} = \sqrt{289} = 17$
 $\sin \alpha = \frac{15}{17}$
 $2 - \frac{17}{8} \sin \alpha = 2 - \frac{17}{8} \cdot \frac{15}{17} = 2 - \frac{15}{8} = \frac{16-15}{8} = \frac{1}{8}$



178. Hesablayın: $\frac{2 \operatorname{tg} \frac{\pi}{4} - \sin 1,5\pi}{(\operatorname{ctg} \frac{\pi}{3} - \operatorname{tg} 2\pi) \cdot \cos \frac{\pi}{6}} = \frac{2 \operatorname{tg} 45^\circ - \sin 270^\circ}{(\operatorname{ctg} 60^\circ - \operatorname{tg} 360^\circ) \cos 30^\circ} =$
 A) -6 B) $-\frac{1}{6}$ C) $\frac{1}{6}$ D) 6 E) $1\frac{1}{2}$

$= \frac{2 \cdot 1 - (-1)}{(\frac{\sqrt{3}}{3} - 0) \cdot \frac{\sqrt{3}}{2}} = \frac{3}{\frac{\sqrt{3}}{3} \cdot \frac{\sqrt{3}}{2}} = \frac{3}{\frac{3}{2}} = 3 \cdot \frac{2}{3} = 2$

179. Hesablayın: $\frac{2 \operatorname{ctg} \frac{\pi}{4} - \cos \pi}{(\operatorname{tg} \frac{\pi}{3} - \operatorname{ctg} \frac{\pi}{6}) \cdot \sin \frac{\pi}{3}} = \frac{2 \operatorname{ctg} 45^\circ - \cos 180^\circ}{(\operatorname{tg} 60^\circ - \operatorname{ctg} 30^\circ) \sin 60^\circ} =$
 A) 2 B) $\frac{1}{2}$ C) 3 D) $\frac{1}{3}$ E) $\sqrt{3}$

180. Sadələşdirin: $\sin^2 2(\pi + 1) + \cos^2 2(\pi - 1) =$
 A) $2 \sin^2 2$ B) $2 \cos^2 2$ C) $\sin^2 2 - \cos^2 2$ D) 2 E) 1

$= \sin^2(2\pi + 2) + \cos^2(2\pi - 2) = \sin^2 2 + \cos^2 2 = 1$

181. Sadələşdirin: $2 \operatorname{tg}^2 2(\pi - 1) \cdot \operatorname{ctg}^2 2(\pi + 1) =$
 A) $2 \sin^2 2$ B) $2 \cos^2 2$ C) $\frac{2}{\sin^2 2}$ D) $\frac{2}{\cos^2 2}$ E) 2

$= 2 \operatorname{tg}^2(2\pi - 2) \cdot \operatorname{ctg}^2(2\pi + 2) = 2 \operatorname{tg}^2 2 \cdot \operatorname{ctg}^2 2 = 2 (\operatorname{tg} 2 \operatorname{ctg} 2)^2 = 2 \cdot 1^2 = 2$

182. Hesablayın: $\frac{\cos(170^\circ + \alpha) - \sin(100^\circ - \alpha)}{\sin(280^\circ - \alpha)} = \frac{\cos(180^\circ - 10^\circ + \alpha) - \sin(90^\circ + 10^\circ - \alpha)}{\sin(270^\circ + 10^\circ - \alpha)} =$
 A) -2 B) -1 C) 0 D) 1 E) 2

$= \frac{\cos(180^\circ + (\alpha - 10^\circ)) - \sin(90^\circ - (\alpha - 10^\circ))}{\sin(270^\circ - (\alpha - 10^\circ))} = \frac{-\cos(\alpha - 10^\circ) - \cos(\alpha - 10^\circ)}{-\cos(\alpha - 10^\circ)} = \frac{-2 \cos(\alpha - 10^\circ)}{-\cos(\alpha - 10^\circ)} = 2$

183. Hesablayın: $\frac{\sin(290^\circ + \alpha) - \cos(340^\circ - \alpha)}{\sin(110^\circ + \alpha)} = \frac{\sin(270^\circ + 20^\circ + \alpha) - \cos(360^\circ - 20^\circ - \alpha)}{\sin(90^\circ + 20^\circ + \alpha)} =$
 A) -2 B) -1 C) 0 D) 1 E) 2

$= \frac{\sin(270^\circ + (20^\circ + \alpha)) - \cos(360^\circ - (20^\circ + \alpha))}{\sin(90^\circ + (20^\circ + \alpha))} = \frac{-\cos(20^\circ + \alpha) - \cos(20^\circ + \alpha)}{\cos(20^\circ + \alpha)} = \frac{-2 \cos(20^\circ + \alpha)}{\cos(20^\circ + \alpha)} = -2$

184. Sadələşdirin: $\frac{\operatorname{tg}(\pi + \alpha) \sin(\frac{3\pi}{2} + \alpha)}{\cos(\pi - \alpha) \operatorname{tg}(\frac{3\pi}{2} - \alpha)} = \frac{\operatorname{tg} \alpha \cdot (-\cos \alpha)}{\cos \alpha \cdot \operatorname{ctg} \alpha} = \operatorname{tg} \alpha \cdot \operatorname{tg} \alpha = \operatorname{tg}^2 \alpha$
 A) $-\operatorname{tg} \alpha$ B) $\sin 2\alpha$ C) $\operatorname{tg} 2\alpha$ D) $-\operatorname{tg}^2 \alpha$ E) $\operatorname{tg}^2 \alpha$

185. $(\sin 30^\circ)^{\cos x + \sin x}$ funksiyasının ən kiçik qiymətini tapın

A) $\frac{1}{2}$ B) $(\frac{1}{2})^{\sqrt{2}}$ C) $\frac{1}{4}$ D) $(\frac{1}{2})^{\sqrt{2}}$ E) $(\frac{1}{2})^{-\sqrt{2}}$
 $\cos x + \sin x = \cos x + \cos(90^\circ - x) = 2 \cos \frac{x + 90^\circ - x}{2} \cdot \cos \frac{x - 90^\circ + x}{2} =$
 $= 2 \cos 45^\circ \cos(x - 45^\circ) = 2 \cdot \frac{\sqrt{2}}{2} \cos(x - 45^\circ) = \sqrt{2} \cos(x - 45^\circ)$
 $(\sin 30^\circ)^{\cos x + \sin x} = (\frac{1}{2})^{\sqrt{2} \cos(x - 45^\circ)} = (\frac{1}{2})^{\sqrt{2} \cdot 1} = (\frac{1}{2})^{\sqrt{2}}$

186. $\sin \alpha = \frac{4}{5}$ və $0^\circ < \alpha < 90^\circ$ olduqda $\cos \alpha$ -ni tapın.

A) $\frac{3}{5}$ B) $\frac{2}{5}$ C) $-\frac{3}{5}$ D) $\frac{3}{4}$ E) $\frac{1}{2}$
 $\alpha \in \text{I}^{\text{ü}} \cos \alpha > 0$

$\cos \alpha = \sqrt{1 - \sin^2 \alpha} = \sqrt{1 - (\frac{4}{5})^2} = \sqrt{1 - \frac{16}{25}} = \sqrt{\frac{25-16}{25}} = \sqrt{\frac{9}{25}} = \frac{3}{5}$

187. $\cos \alpha = \frac{12}{13}$ və $0^\circ < \alpha < 90^\circ$ olduqda $\sin \alpha$ -ni tapın.

A) $-\frac{5}{13}$ B) $\frac{3}{13}$ C) $-\frac{4}{13}$ D) $\frac{5}{13}$ E) $\frac{7}{13}$

$\sin \alpha = \sqrt{1 - \cos^2 \alpha} = \sqrt{1 - (\frac{12}{13})^2} = \sqrt{1 - \frac{144}{169}} = \sqrt{\frac{169-144}{169}} = \sqrt{\frac{25}{169}} = \frac{5}{13}$

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188. $\cos \alpha = \frac{4}{5}$ və $0 < \alpha < \frac{\pi}{2}$ olduqda $\sin(\pi - \alpha) + \cos(\frac{\pi}{2} - \alpha)$ ifadəsini hesablayın.
 A) 0,4 B) 2 C) 1,2 D) 1,4 E) 2,2

$$\sin(\pi - \alpha) + \cos(\frac{\pi}{2} - \alpha) = \sin \alpha + \sin \alpha = 2 \sin \alpha = 2 \sqrt{1 - \cos^2 \alpha} = 2 \sqrt{1 - (\frac{4}{5})^2} = 2 \sqrt{1 - \frac{16}{25}} = 2 \sqrt{\frac{25-16}{25}} = 2 \sqrt{\frac{9}{25}} = 2 \cdot \frac{3}{5} = \frac{6}{5} = 1,2$$

189. $\operatorname{tg} \alpha = \frac{5}{12}$ və $0^\circ < \alpha < 90^\circ$ olduqda $\cos \alpha$ -ni tapın.
 A) $\frac{5}{13}$ B) $-\frac{12}{13}$ C) $1\frac{1}{12}$ D) $\frac{12}{13}$ E) $2\frac{3}{5}$

$c = \sqrt{12^2 + 5^2} = \sqrt{169} = 13$

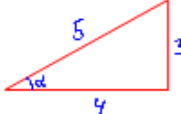
$\alpha \in I$ və $\cos \alpha > 0$ $\cos \alpha = \frac{12}{13}$



190. $\operatorname{tg} \alpha = \frac{3}{4}$ və $0^\circ < \alpha < 90^\circ$ olduqda $\cos \alpha$ -ni tapın.
 A) $-\frac{4}{5}$ B) $\frac{3}{5}$ C) $-\frac{3}{5}$ D) $\frac{4}{5}$ E) $1\frac{1}{4}$

$c = \sqrt{3^2 + 4^2} = \sqrt{9+16} = \sqrt{25} = 5$

$\cos \alpha = \frac{4}{5}$

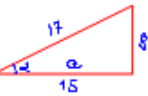


191. Əgər $90^\circ < \alpha < 180^\circ$ və $\sin \alpha = \frac{8}{17}$ isə $\operatorname{tg} \alpha$ -ni tapın.
 A) $-\frac{8}{15}$ B) $\frac{15}{17}$ C) -15 D) 8 E) $\frac{8}{15}$

$\alpha \in II$ və $\operatorname{tg} \alpha < 0$

$a = \sqrt{17^2 - 8^2} = \sqrt{289 - 64} = \sqrt{225} = 15$

$\operatorname{tg} \alpha = -\frac{8}{15}$



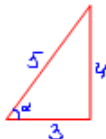
192. Hesablayın $\operatorname{ctg} 1^\circ \cdot \operatorname{ctg} 2^\circ \cdot \dots \cdot \operatorname{ctg} 88^\circ \cdot \operatorname{ctg} 89^\circ =$
 A) 45 B) 90 C) 89 D) 1 E) 0

$= \operatorname{ctg} 1^\circ \cdot \operatorname{ctg} 89^\circ \cdot \dots \cdot \operatorname{ctg} 88^\circ \cdot \operatorname{ctg} 2^\circ = 1$

193. $\cos \alpha = \frac{3}{5}$ və $-\frac{\pi}{2} < \alpha < 0$ olduqda $\operatorname{ctg} \alpha$ -ni tapın.
 A) $-\frac{4}{3}$ B) $\frac{4}{3}$ C) $-\frac{3}{4}$ D) $\frac{2}{3}$ E) $\frac{2}{5}$

$\alpha \in IV$ $\operatorname{ctg} \alpha < 0$ $b = \sqrt{5^2 - 3^2} = 4$

$\operatorname{ctg} \alpha = -\frac{3}{4}$



194. Sadələşdirin: $\cos \alpha \left(1 + \frac{1}{\cos \alpha} + \operatorname{tg} \alpha\right) \left(1 - \frac{1}{\cos \alpha} + \operatorname{tg} \alpha\right) =$
 A) $2 \sin \alpha$ B) $2 \cos \alpha$ C) $2 \sin^2 \alpha \cos \alpha$
 D) $2 \sin^2 \alpha \cos^2 \alpha$ E) $\cos^2 \alpha$

$$= \cos \alpha \cdot \frac{\cos \alpha + 1 + \sin \alpha}{\cos \alpha} \cdot \frac{\cos \alpha - 1 + \sin \alpha}{\cos \alpha} = \frac{(\cos \alpha + \sin \alpha + 1)(\cos \alpha + \sin \alpha - 1)}{\cos^2 \alpha} = \frac{(\cos \alpha + \sin \alpha)^2 - 1^2}{\cos^2 \alpha} = \frac{\cos^2 \alpha + 2 \sin \alpha \cos \alpha + \sin^2 \alpha - 1}{\cos^2 \alpha} = \frac{1 + 2 \sin \alpha \cos \alpha - 1}{\cos^2 \alpha} = \frac{2 \sin \alpha \cos \alpha}{\cos^2 \alpha} = 2 \sin \alpha$$

195. $\operatorname{tg} \alpha = \frac{1}{3}$ olduqda $\frac{\sin \alpha - \cos \alpha}{\sin \alpha + \cos \alpha}$ -ni hesablayın.
 A) 2 B) 3 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) $\frac{1}{3}$

$$= \frac{\frac{\sin \alpha}{\cos \alpha} - \frac{\cos \alpha}{\cos \alpha}}{\frac{\sin \alpha}{\cos \alpha} + \frac{\cos \alpha}{\cos \alpha}} = \frac{\operatorname{tg} \alpha - 1}{\operatorname{tg} \alpha + 1} = \frac{\frac{1}{3} - 1}{\frac{1}{3} + 1} = \frac{\frac{1-3}{3}}{\frac{1+3}{3}} = \frac{-2}{4} = -\frac{1}{2}$$

196. İfadəni sadələşdirin: $\frac{\sin^2 \alpha - \cos^2 \alpha}{\sin \alpha - \cos \alpha} - \sin \alpha \cos \alpha =$
 A) $-\sin 2\alpha$ B) -1 C) 1 D) 0 E) $1 - \sin 2\alpha$

$$= \frac{(\sin \alpha - \cos \alpha)(\sin \alpha + \cos \alpha)}{\sin \alpha - \cos \alpha} - \sin \alpha \cos \alpha = \sin \alpha + \cos \alpha - \sin \alpha \cos \alpha = 1$$

197. $\sin \alpha + \cos \alpha = a$ olduğunu bilərək, $\sin^2 \alpha + \cos^2 \alpha$ ifadəsini hesablayın.

- A) $\frac{a^2-1}{3}$ B) $\frac{a^2-a}{2}$ C) $\frac{a^2+a}{2}$ D) $\frac{2a-a^2}{2}$ E) $\frac{a^2+2a}{3}$

$(\sin \alpha + \cos \alpha)^2 = a^2$ $(\sin \alpha - \cos \alpha)^2 = a^2$

$\sin^2 \alpha + 3 \sin \alpha \cos \alpha + 3 \sin \alpha \cos \alpha + \cos^2 \alpha = a^2$ $\sin^2 \alpha + 2 \sin \alpha \cos \alpha + \cos^2 \alpha = a^2$

$\sin^2 \alpha + 3 \sin \alpha \cos \alpha (\sin \alpha + \cos \alpha) + \cos^2 \alpha = a^2$ $1 + 2 \sin \alpha \cos \alpha = a^2$

$\sin^2 \alpha + 3 \cdot \frac{a^2-1}{2} \cdot a + \cos^2 \alpha = a^2$ $2 \sin \alpha \cos \alpha = a^2 - 1$

$\sin^2 \alpha + \cos^2 \alpha = a^2 - 3a \cdot \frac{a^2-1}{2} = \frac{2a^2 - 3a^3 + 3a}{2} = \frac{3a - a^3}{2}$ $\sin \alpha \cos \alpha = \frac{a^2-1}{2}$

198. a -nın hansı qiymətlərində $a \sin 2 \cdot \cos 3 \cdot \operatorname{tg} 4$ ifadəsinin qiyməti həmişə mənfidir?

- A) $a < -5$ B) $a > -5$ C) $a = 8$ D) $a < 0$ E) $a > 0$
- $2 \approx 2 \cdot 57,3^\circ = 114,6^\circ \in II$ $\sin 2 > 0$ $a \cdot \sin 2 \cdot \cos 3 \cdot \operatorname{tg} 4 < 0$
- $3 \approx 3 \cdot 57,3^\circ = 171,9^\circ \in II$ $\cos 3 < 0$ $a \cdot (-) < 0$
- $4 \approx 4 \cdot 57,3^\circ = 229,2^\circ \in III$ $\operatorname{tg} 4 > 0$ $a > 0$ olmalıdır.

199. a -nın hansı qiymətlərində $a \sin 1 \cdot \cos 4 \cdot \operatorname{tg} 3$ həmişə müsbət olar?

- A) $a > 0$ B) $a < 0$ C) $-\infty < a < \infty$ D) a E) $a = 0$
- $a \cdot \sin 1 \cdot \cos 4 \cdot \operatorname{tg} 3 > 0$
- $a \cdot (+) > 0$
- $a > 0$ olmalıdır.

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200. Ədədləri müqayisə edin: $a = \overset{-}{\sin} 4$, $b = \overset{+}{\sin} 4^\circ$, $c = 0$.
 A) $a < c < b$ B) $a < b < c$ C) $b < a < c$
 D) $b < c < a$ E) $a = b < c$

$4 \approx 4.573^\circ = 229.2^\circ \in \underline{\underline{II}}$ $a < c < b$
 $\sin 4 < 0$

201. Aşağıdakı ədədləri müqayisə edin: $a = \overset{-}{\cos} 4$, $b = \overset{+}{\cos} 4^\circ$ və $c = 0$.
 A) $a < c < b$ B) $a < b < c$ C) $b < c < a$
 D) $b < c < a$ E) $c < c < b$

$a < c < b$

202. $\operatorname{tg} x = 2$ olarsa, $\frac{3 \sin \alpha - 5 \cos \alpha}{4 \sin \alpha + \cos \alpha}$ ifadəsinin qiymətini tapın.

- A) 0 B) -1 C) 1 D) $-\frac{1}{9}$ E) $\frac{1}{9}$

$\frac{\frac{3 \sin \alpha}{\cos \alpha} - \frac{5 \cos \alpha}{\cos \alpha}}{\frac{4 \sin \alpha}{\cos \alpha} + \frac{\cos \alpha}{\cos \alpha}} = \frac{3 \operatorname{tg} \alpha - 5}{4 \operatorname{tg} \alpha + 1} = \frac{3 \cdot 2 - 5}{4 \cdot 2 + 1} = \frac{6 - 5}{8 + 1} = \frac{1}{9}$

203. $\operatorname{tg} x = 0,4$ olduqda $\frac{\sin \alpha + 3 \cos \alpha}{3 \cos \alpha - 5 \sin \alpha}$ nəyə bərabər olar?

- A) 3,4 B) -3 C) 0,8 D) 3 E) -5

$\frac{\frac{\sin \alpha}{\cos \alpha} + 3 \frac{\cos \alpha}{\cos \alpha}}{\frac{3 \cos \alpha}{\cos \alpha} - 5 \frac{\sin \alpha}{\cos \alpha}} = \frac{\operatorname{tg} \alpha + 3}{3 - 5 \operatorname{tg} \alpha} = \frac{0,4 + 3}{3 - 5 \cdot 0,4} = \frac{3,4}{3 - 2} = 3,4$

204. $\operatorname{tg} x = 1,5$ olduqda $\frac{2 \sin \alpha - 5 \cos \alpha}{4 \cos \alpha - 3 \sin \alpha}$ nəyə bərabər olar?

- A) 3,5 B) -3 C) 4 D) 3 E) 1,5

$\frac{\frac{2 \sin \alpha}{\cos \alpha} - \frac{5 \cos \alpha}{\cos \alpha}}{\frac{4 \cos \alpha}{\cos \alpha} - \frac{3 \sin \alpha}{\cos \alpha}} = \frac{2 \operatorname{tg} \alpha - 5}{4 - 3 \operatorname{tg} \alpha} = \frac{2 \cdot 1,5 - 5}{4 - 3 \cdot 1,5} = \frac{3 - 5}{4 - 4,5} = \frac{-2}{-0,5} = \frac{20}{5} = 4$

205. $\operatorname{tg} x = \frac{1}{5}$ olduqda $\frac{\sin \alpha + \cos \alpha}{\sin \alpha - \cos \alpha}$ ifadəsinin qiymətini hesablayın.

- A) 2,5 B) -2,5 C) 1,5 D) -1,5 E) 2

$\frac{\frac{\sin \alpha}{\cos \alpha} + \frac{\cos \alpha}{\cos \alpha}}{\frac{\sin \alpha}{\cos \alpha} - \frac{\cos \alpha}{\cos \alpha}} = \frac{\operatorname{tg} \alpha + 1}{\operatorname{tg} \alpha - 1} = \frac{\frac{1}{5} + 1}{\frac{1}{5} - 1} = \frac{\frac{6}{5}}{\frac{-4}{5}} = \frac{6}{-4} = -1,5$

206. İfadəni sadələşdirin: $\frac{360^\circ + 180^\circ}{5 \cdot 180^\circ} \cos(270^\circ + \alpha) \sin \alpha + \sin^2(540^\circ + \alpha) + \operatorname{tg}(900^\circ + \alpha) \operatorname{ctg} \alpha =$
 A) $2 + \cos 2\alpha$ B) $2 + \sin 2\alpha$ C) $1 - \cos 2\alpha$
 D) $2 - \cos 2\alpha$ E) $2 - \sin 2\alpha$

$= \sin \alpha \cdot \sin \alpha + \sin^2 \alpha + \operatorname{tg} \alpha \cdot \operatorname{ctg} \alpha = 2 \sin^2 \alpha + 1 =$
 $= 2 \cdot \frac{1 - \cos 2\alpha}{2} + 1 = 1 - \cos 2\alpha + 1 = 2 - \cos 2\alpha$

207. $\operatorname{ctg} x = 2$ olduğunu bilərək, $\frac{\cos^3 \alpha + \sin^3 \alpha}{\sin^3 \alpha + 3 \sin^2 \alpha \cos \alpha}$ ifadəsinin qiymətini tapın.

- A) $\frac{7}{9}$ B) $-\frac{9}{5}$ C) $\frac{9}{5}$ D) $\frac{9}{7}$ E) $\frac{8}{7}$

$= \frac{\frac{\cos^3 \alpha}{\sin^3 \alpha} + \frac{\sin^3 \alpha}{\sin^3 \alpha}}{\frac{6 \sin^2 \alpha}{8 \sin^3 \alpha} + \frac{3 \sin^2 \alpha \cos \alpha}{8 \sin^3 \alpha}} = \frac{\operatorname{ctg}^3 \alpha + 1}{1 + 3 \operatorname{ctg} \alpha} = \frac{2^3 + 1}{1 + 3 \cdot 2} = \frac{9}{7}$

208. $\operatorname{ctg} x = 2$ olduğunu bilərək, $\frac{3 \sin \alpha \cos \alpha + \cos^2 \alpha}{\sin^2 \alpha - 2 \cos^2 \alpha}$ ifadəsinin qiymətini tapın.

- A) $\frac{10}{7}$ B) $-\frac{10}{7}$ C) $-\frac{10}{9}$ D) $\frac{10}{9}$ E) $\frac{7}{10}$

$= \frac{\frac{3 \sin \alpha \cos \alpha}{\sin^2 \alpha} + \frac{\cos^2 \alpha}{\sin^2 \alpha}}{\frac{6 \sin \alpha \cos \alpha}{8 \sin^3 \alpha} - \frac{2 \cos^2 \alpha}{8 \sin^3 \alpha}} = \frac{3 \operatorname{ctg} \alpha + \operatorname{ctg}^2 \alpha}{1 - 2 \operatorname{ctg}^2 \alpha} = \frac{3 \cdot 2 + 2^2}{1 - 2 \cdot 2^2} = \frac{6 + 4}{1 - 8} = \frac{10}{-7} = -\frac{10}{7}$

209. Sadələşdirin:

$\cos\left(\frac{\pi}{2} - \alpha\right) \cdot \sin \alpha - \cos^2\left(\frac{3\pi}{2} + \alpha\right) + \operatorname{tg}(720^\circ + \alpha) \operatorname{ctg}(\pi + \alpha) =$
 A) 1 B) 0 C) -1 D) 2 E) -2

$= \sin \alpha \cdot \sin \alpha - \sin^2 \alpha + \operatorname{tg} \alpha \cdot \operatorname{ctg} \alpha = \sin^2 \alpha - \sin^2 \alpha + 1 = 1$

210. $\sin \alpha \cdot \cos \alpha = \frac{3}{8}$ olarsa, $|\sin \alpha - \cos \alpha|$ -ni tapın.

A) 0,5 B) $\frac{\sqrt{7}}{2}$ C) $\sqrt{\frac{5}{8}}$ D) 0,25 E) 0
 $|\sin \alpha - \cos \alpha| = \sqrt{(\sin \alpha - \cos \alpha)^2} = \sqrt{\sin^2 \alpha - 2 \sin \alpha \cos \alpha + \cos^2 \alpha} =$
 $= \sqrt{1 - 2 \cdot \frac{3}{8}} = \sqrt{1 - \frac{6}{8}} = \sqrt{\frac{8-6}{8}} = \sqrt{\frac{2}{8}} = \sqrt{\frac{1}{4}} = \frac{1}{2} = 0,5$

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211. İfadəni sadələşdirin:

$$\begin{aligned} & \operatorname{tg}\left(\frac{3\pi}{2}-\alpha\right) \cdot \operatorname{tg}(\pi+\alpha) - \cos\left(\frac{\pi}{2}+\alpha\right) \sin(\pi+\alpha) = \\ & \text{A) } \sin^2 \alpha \quad \text{B) } \cos^2 \alpha \quad \text{C) } \operatorname{tg}^2 \alpha \quad \text{D) } \operatorname{ctg}^2 \alpha \quad \text{E) } 1 + \sin^2 \alpha \\ & = \operatorname{ctg} \alpha \cdot \operatorname{tg} \alpha - (-\sin \alpha) \cdot (-\sin \alpha) = 1 - \sin^2 \alpha = \cos^2 \alpha \end{aligned}$$

212. $\sin \alpha \cdot \cos \alpha = \frac{1}{3}$ olarsa, $|\sin \alpha + \cos \alpha|$ -ni tapın.

A) $\sqrt{\frac{5}{3}}$ B) $\frac{4}{3}$ C) $\frac{3}{4}$ D) $\frac{\sqrt{3}}{2}$ E) 1

$$\begin{aligned} |\sin \alpha + \cos \alpha| &= \sqrt{(\sin \alpha + \cos \alpha)^2} = \sqrt{\sin^2 \alpha + 2 \sin \alpha \cos \alpha + \cos^2 \alpha} = \\ &= \sqrt{1 + 2 \cdot \frac{1}{3}} = \sqrt{1 + \frac{2}{3}} = \sqrt{\frac{3+2}{3}} = \sqrt{\frac{5}{3}} \end{aligned}$$

213. Hesablayın: $\sin 18^\circ \cdot \sin 54^\circ$.

A) 0,5 B) 1 C) 0,25 D) $\frac{1}{3}$ E) 0,125

$$\begin{aligned} \sin 18^\circ \sin 54^\circ &= \frac{2 \sin 18^\circ \cos 18^\circ \sin 54^\circ}{2 \cos 18^\circ} = \frac{\sin 36^\circ \sin (90^\circ - 36^\circ)}{2 \cos 18^\circ} = \\ &= \frac{2 \sin 36^\circ \cos 36^\circ}{2 \cdot 2 \cos 18^\circ} = \frac{\sin 72^\circ}{4 \sin 72^\circ} = \frac{1}{4} = 0,25 \end{aligned}$$

214. İfadəni sadələşdirin: $\sin 15^\circ \cdot \sin 75^\circ = \sin 15^\circ \sin (90^\circ - 15^\circ) =$

A) $\frac{\sqrt{3}}{2}$ B) $\sin 65^\circ$ C) $\frac{1}{4}$ D) $\frac{\sqrt{2}}{2}$ E) 1

$$= \frac{1}{2} \cdot 2 \sin 15^\circ \cos 15^\circ = \frac{1}{2} \cdot \sin 30^\circ = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

215. $y = \operatorname{tg}(\cos x)$ funksiyasının təyin oblastını tapın.

A) $(-\infty; +\infty)$ B) $(-\frac{\pi}{2}; \frac{\pi}{2})$ C) $(-\infty; -\frac{\pi}{2})$
D) $(-\frac{\pi}{2}; +\infty)$ E) $(\frac{\pi}{2}; +\infty)$

$$-1 \leq \cos x \leq 1$$

$$-12 - 57,3^\circ \leq \cos x \leq 57,3^\circ \approx 1$$

$\operatorname{tg} x$ $[-57,3; 57,3]$ -da mənalı olduğundan $\cos x$ üçün $2\mathbb{R} = (-\infty; \infty)$

216. $y = \operatorname{tg}(\sin x)$ funksiyasının təyin oblastını tapın.

A) $(-\frac{\pi}{2}; \frac{\pi}{2})$ B) $(0; +\infty)$ C) $[0; -\frac{\pi}{2})$
D) $(-\infty; +\infty)$ E) $(-\infty; -\frac{\pi}{2})$

215 ilə eyni

217. $\operatorname{tg} \alpha = 1\frac{1}{3}$ olarsa, $\frac{3 \sin \alpha - 4 \cos \alpha}{4 \cos \alpha + 3 \sin \alpha}$ ifadəsinin qiymətini tapın.

A) 1 B) 0 C) $\frac{1}{3}$ D) $-\frac{1}{3}$ E) -1

$$\begin{aligned} &= \frac{\frac{3 \sin \alpha}{\cos \alpha} - \frac{4 \cos \alpha}{\cos \alpha}}{\frac{4 \cos \alpha}{\cos \alpha} + \frac{3 \sin \alpha}{\cos \alpha}} = \frac{3 \operatorname{tg} \alpha - 4}{4 + 3 \operatorname{tg} \alpha} = \frac{3 \cdot 1\frac{1}{3} - 4}{4 + 3 \cdot 1\frac{1}{3}} = \frac{3 \cdot \frac{4}{3} - 4}{4 + 3 \cdot \frac{4}{3}} = \\ &= \frac{4 - 4}{4 + 4} = \frac{0}{8} = 0 \end{aligned}$$

218. İfadəni sadələşdirin: $\frac{\sin(\pi-\alpha) \cos(\frac{3\pi}{2}-\alpha) \operatorname{ctg}(\frac{\pi}{2}+\alpha)}{\operatorname{tg}(2\pi-\alpha)}$

A) 1 B) -1 C) $-\sin^2 \alpha$ D) $\sin^2 \alpha$ E) $-\sin \alpha - \cos \alpha$

$$= \frac{\sin \alpha \cdot (-\sin \alpha) \cdot (-\operatorname{tg} \alpha)}{-\operatorname{tg} \alpha} = -\sin^2 \alpha$$

219. Əgər $\operatorname{tg} \alpha = -3$ olarsa, $\frac{-2 \sin \alpha + 3 \cos \alpha}{4 \cos \alpha + 3 \sin \alpha}$ ifadəsinin qiymətini tapın.

A) -2,4 B) -1,8 C) 1,8 D) -1,6 E) 2,4

$$\begin{aligned} &= \frac{-\frac{2 \sin \alpha}{\cos \alpha} + \frac{3 \cos \alpha}{\cos \alpha}}{\frac{4 \cos \alpha}{\cos \alpha} + \frac{3 \sin \alpha}{\cos \alpha}} = \frac{-2 \operatorname{tg} \alpha + 3}{4 + 3 \operatorname{tg} \alpha} = \frac{-2 \cdot (-3) + 3}{4 + 3 \cdot (-3)} = \frac{6 + 3}{4 - 9} = \\ &= \frac{9}{-5} = -1,8 \end{aligned}$$

220. İfadəni sadələşdirin: $\frac{\cos(\alpha+125^\circ)}{\sin(\alpha+35^\circ)} = \frac{\cos(90^\circ + (\alpha+35^\circ))}{\sin(\alpha+35^\circ)} = \frac{-\sin(\alpha+35^\circ)}{\sin(\alpha+35^\circ)}$

A) 1 B) -1 C) $\operatorname{tg}(\alpha+35^\circ)$ D) $-\operatorname{ctg}(\alpha+35^\circ)$ E) $\frac{7}{25}$

$$= -1$$

221. $y = \sin x + \cos x \cdot \operatorname{tg} x$ funksiyasının qiymətlər oblastını tapın.

A) $[-1; 1]$ B) $(-1; 1)$ C) $[-2; 2]$ D) $[-2; 2)$ E) $(-2; 2)$

$$\operatorname{tg} x = \frac{\sin x}{\cos x} \Rightarrow \cos x \neq 0 \Rightarrow \sin x \neq \pm 1$$

$$y = \sin x + \cos x \cdot \frac{\sin x}{\cos x} = \sin x + \sin x = 2 \sin x$$

$$\sin x \rightarrow -1: 2 \sin x \rightarrow 2 \cdot (-1) = -2$$

$$\sin x \rightarrow 1: 2 \sin x \rightarrow 2 \cdot 1 = 2 \quad (-2; 2)$$

222. $y = \cos x + \sin x \cdot \operatorname{ctg} x$ funksiyasının qiymətlər oblastını tapın.

A) $(-1; 1)$ B) $[-1; 1]$ C) $[-2; 2]$ D) $(-2; 2)$ E) $(-2; 2]$

$$\operatorname{ctg} x = \frac{\cos x}{\sin x} \Rightarrow \sin x \neq 0 \Rightarrow \cos x \neq \pm 1$$

$$y = \cos x + \sin x \cdot \frac{\cos x}{\sin x} = \cos x + \cos x = 2 \cos x$$

$$\cos x \rightarrow -1: 2 \cos x = 2 \cdot (-1) = -2 \quad \cos x \rightarrow 1: 2 \cos x = 2 \cdot 1 = 2 \quad (-2; 2)$$

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223. $y = \sin x \cdot \cos x - \frac{1}{2}$ funksiyasının qiymətlər oblasını tapın.

- A) $[-1; 1]$ B) $[0; 1]$ C) $[-0,5; 1,5]$ D) $[-1; 2]$ E) $[-1; 0]$

$$y = \frac{1}{2} \cdot 2 \sin x \cos x - \frac{1}{2} = \frac{1}{2} \sin 2x - \frac{1}{2} = \frac{1}{2} (\sin 2x - 1)$$

$$-1 \leq \sin 2x \leq 1$$

$$\text{JKQ} \left[\frac{1}{2} (\sin 2x - 1) \right] = \frac{1}{2} (-1 - 1) = \frac{1}{2} \cdot (-2) = -1$$

$$\text{JBQ} \left[\frac{1}{2} (\sin 2x - 1) \right] = \frac{1}{2} (1 - 1) = \frac{1}{2} \cdot 0 = 0 \quad [-1; 0]$$

224. $y = \sin x \cdot \cos x - \frac{1}{2}$ funksiyasının qiymətlər oblasını tapın.

- A) $[-1; 0]$ B) $[-\frac{1}{2}; \frac{1}{2}]$ C) $[\frac{1}{2}; -\frac{1}{2}]$ D) $(-2; 2)$ E) $[0; -1]$

$$y = \frac{1}{2} \cdot 2 \sin x \cos x - \frac{1}{2} = \frac{1}{2} \sin 2x - \frac{1}{2} = \frac{1}{2} (\sin 2x - 1)$$

$$-1 \leq \sin 2x \leq 1$$

$$\text{JKQ} \left[\frac{1}{2} (\sin 2x - 1) \right] = \frac{1}{2} (-1 - 1) = \frac{1}{2} \cdot (-2) = -1$$

$$\text{JBQ} \left[\frac{1}{2} (\sin 2x - 1) \right] = \frac{1}{2} (1 - 1) = \frac{1}{2} \cdot 0 = 0 \quad [-1; 0]$$

225. $\sin \alpha = \frac{3}{5}$ və α ikinci rübdədirsə, $\text{tg} \left(\frac{3\pi}{2} - 2\alpha \right)$ -ni hesablayın.

- A) $-\frac{5}{29}$ B) $\frac{7}{25}$ C) $-\frac{7}{24}$ D) $\frac{11}{24}$ E) $\frac{6}{25}$

$$\text{tg} \left(\frac{3\pi}{2} - 2\alpha \right) = \text{ctg} 2\alpha = \frac{\cos 2\alpha}{\sin 2\alpha} = \frac{\cos^2 \alpha - \sin^2 \alpha}{2 \sin \alpha \cos \alpha} =$$

$$= \frac{1 - \sin^2 \alpha - \sin^2 \alpha}{2 \sin \alpha \cos \alpha} = \frac{1 - 2 \sin^2 \alpha}{2 \sin \alpha \cos \alpha} = \frac{1 - 2 \left(\frac{3}{5} \right)^2}{2 \cdot \frac{3}{5} \cdot \frac{4}{5}} = \frac{1 - \frac{18}{25}}{\frac{24}{25}} = \frac{\frac{7}{25}}{\frac{24}{25}} = \frac{7}{24}$$

$$\cos \alpha = -\sqrt{1 - \sin^2 \alpha} = -\sqrt{1 - \frac{9}{25}} = -\sqrt{\frac{16}{25}} = -\frac{4}{5}$$

226. $\sin 2\alpha = -\frac{1}{3}$ olarsa $\text{tg}^2 \left(\frac{3\pi}{4} - \alpha \right)$ -ni tapın.

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$

$$\text{tg}^2 \left(\frac{3\pi}{4} - \alpha \right) = \frac{1 - \cos 2\alpha}{1 + \cos 2\alpha} = \frac{1 - \cos \left(\frac{3\pi}{2} - 2\alpha \right)}{1 + \cos \left(\frac{3\pi}{2} - 2\alpha \right)} = \frac{1 + \sin 2\alpha}{1 - \sin 2\alpha} =$$

$$= \frac{1 + \left(-\frac{1}{3}\right)}{1 - \left(-\frac{1}{3}\right)} = \frac{1 - \frac{1}{3}}{1 + \frac{1}{3}} = \frac{\frac{2}{3}}{\frac{4}{3}} = \frac{2}{3} \cdot \frac{3}{4} = \frac{1}{2}$$

227. $y = \frac{1}{\sin^2 x} + \frac{1}{\cos^2 x}$ funksiyasının qiymətlər oblasını tapın.

- A) $[4; +\infty)$ B) $[-1; 1]$ C) $[0; 4]$ D) $[1; 2]$ E) $[2; 3]$

$$y = \frac{\cos^2 x + \sin^2 x}{\sin^2 x \cos^2 x} = \frac{1}{\sin^2 x \cos^2 x} = \frac{4}{\sin^2 2x}$$

$$0 < \sin^2 2x \leq 1$$

$$\lim_{\sin^2 2x \rightarrow 0} \frac{4}{\sin^2 2x} = +\infty$$

$$\lim_{\sin^2 2x \rightarrow 1} \frac{4}{\sin^2 2x} = \frac{4}{1} = 4 \quad [4; +\infty)$$

228. Funksiyanın qiymətlər oblasını tapın $y = \text{tg} x + \text{ctg} x$.

- A) $(-\infty; -2] \cup [2; +\infty)$ B) $(-\infty; +\infty)$ C) $[2; +\infty)$
D) $(-\infty; -2]$ E) $(0; +\infty)$

$$y = \text{tg} x + \text{ctg} x = \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{\sin^2 x + \cos^2 x}{\sin x \cos x} = \frac{2}{\sin 2x} =$$

$$= \frac{2}{\sin 2x} \quad \lim_{\sin 2x \rightarrow -1} \frac{2}{\sin 2x} = \frac{2}{-1} = -2$$

$$\lim_{\sin 2x \rightarrow 0} \frac{2}{\sin 2x} = -\infty \quad (-\infty; -2]$$

$$\lim_{\sin 2x \rightarrow 1} \frac{2}{\sin 2x} = 2 \quad (2; +\infty)$$

$$\lim_{\sin 2x \rightarrow 0^+} \frac{2}{\sin 2x} = \infty \quad (-\infty; -2] \cup [2; +\infty)$$

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229. İfadəni sadələşdirin: $\sin^2 \left(\frac{3\pi}{4} - \alpha \right) + \frac{1}{2} \sin 2\alpha =$

- A) 1 B) $\frac{1}{2}$ C) $\sqrt{2}$ D) $\frac{\sqrt{2}}{2}$ E) $-\frac{1}{2}$

$$= \frac{1 - \cos 2\left(\frac{3\pi}{4} - \alpha\right)}{2} + \frac{1}{2} \sin 2\alpha = \frac{1 - \cos \left(\frac{3\pi}{2} - 2\alpha\right)}{2} + \frac{1}{2} \sin 2\alpha =$$

$$= \frac{1 - \sin 2\alpha}{2} + \frac{1}{2} \sin 2\alpha = \frac{1 - \sin 2\alpha + \sin 2\alpha}{2} = \frac{1}{2}$$

230. Dəyişənin hansı qiymətlərində $\sqrt{1 - \sqrt{x}}$ ifadəsinin mənası vardır?

- A) $0 \leq x \leq 1$ B) $x \geq 0$ C) $x \leq 1$ D) $0 < x < 1$ E) $x = 1$

$$\begin{cases} x \geq 0 \\ 1 - \sqrt{x} \geq 0 \end{cases} \Rightarrow \begin{cases} x \geq 0 \\ \sqrt{x} \leq 1 \end{cases} \Rightarrow \begin{cases} x \geq 0 \\ x \leq 1 \end{cases} \quad 0 \leq x \leq 1$$

231. $\cos 1^\circ + \cos 2^\circ + \dots + \cos 179^\circ + \cos 180^\circ$ cəmini tapın.

- A) 180 B) 0 C) -1 D) 1 E) 180

$$= \cos 1^\circ + \cos 2^\circ + \dots + \cos (180^\circ - 2^\circ) + \cos (180^\circ - 1^\circ) + \cos 180^\circ =$$

$$= \cos 1^\circ + \cos 2^\circ + \dots + (-\cos 2^\circ) + (-\cos 1^\circ) + (-1) = -1$$

232. İfadəni sadələşdirin: $\frac{\sin \alpha + \sin 3\alpha}{\cos \alpha + \cos 3\alpha} (1 + \cos 4\alpha) =$

- A) $2 \sin 2\alpha$ B) $2 \cos 2\alpha$ C) $\cos 4\alpha$ D) $\sin 4\alpha$ E) 0

$$= \frac{2 \sin \frac{\alpha+3\alpha}{2} \cos \frac{\alpha-3\alpha}{2}}{2 \cos \frac{\alpha+3\alpha}{2} \cos \frac{\alpha-3\alpha}{2}} \cdot (1 + \cos^2 2\alpha - \sin^2 2\alpha) = \frac{\sin 2\alpha \cdot 2 \cos^2 2\alpha}{\cos 2\alpha} =$$

$$= 2 \sin 2\alpha \cdot \cos 2\alpha = \sin 4\alpha$$

kömənçə bucaq daxil etmək üsulundan istifadə edər.

233. İfadənin ən böyük qiymətini tapın: $5 \sin x - 5\sqrt{3} \cos x$.

- A) 10 B) $5(1 + \sqrt{3})$ C) $5(\sqrt{3} - 1)$ D) $5\sqrt{3}$ E) 0

$$\sqrt{5^2 + (5\sqrt{3})^2} = \sqrt{25 + 75} = \sqrt{100} = 10$$

$$5 \sin x - 5\sqrt{3} \cos x = 10 \cdot \left(\frac{5}{10} \sin x - \frac{5\sqrt{3}}{10} \cos x \right) = 10 \left(\frac{1}{2} \sin x - \frac{\sqrt{3}}{2} \cos x \right) =$$

$$= 10 (\sin x \cos 60^\circ - \cos x \sin 60^\circ) = 10 \sin(x - 60^\circ)$$

$$-1 \leq \sin(x - 60^\circ) \leq 1$$

$$\text{JBQ} (10 \sin(x - 60^\circ)) = 10 \cdot 1 = 10$$

234. $\text{tg} 15^\circ$ -nin qiymətini tapın

- A) $2 + \sqrt{3}$ B) $\sqrt{3} + 2$ C) $\sqrt{3} - 2$ D) $\sqrt{2} + 2$ E) $2 - \sqrt{3}$

$$\text{tg} 15^\circ = \frac{1 - \cos 30^\circ}{1 + \cos 30^\circ} = \frac{1 - \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}} = \frac{\frac{2 - \sqrt{3}}{2}}{\frac{2 + \sqrt{3}}{2}} = \frac{2 - \sqrt{3}}{2 + \sqrt{3}} = \frac{(2 - \sqrt{3})^2}{4 - 3} = 2 - \sqrt{3}$$

$$\text{tg} 15^\circ = \text{tg}(45^\circ - 30^\circ) = \frac{\text{tg} 45^\circ - \text{tg} 30^\circ}{1 + \text{tg} 45^\circ \text{tg} 30^\circ} = \frac{1 - \frac{\sqrt{3}}{3}}{1 + 1 \cdot \frac{\sqrt{3}}{3}} = \frac{\frac{3 - \sqrt{3}}{3}}{\frac{3 + \sqrt{3}}{3}} = \frac{3 - \sqrt{3}}{3 + \sqrt{3}} =$$

$$= \frac{(3 - \sqrt{3})^2}{9 - 3} = \frac{9 - 6\sqrt{3} + 3}{6} = \frac{12 - 6\sqrt{3}}{6} = \frac{6(2 - \sqrt{3})}{6} = 2 - \sqrt{3}$$

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235. Funksiyanın qiymətlər oblastını tapın: $y = 5 - \sin^2 \alpha \cdot \cos^2 \alpha$.

- A) [4; 6] B) [0; 5] C) [4; 5] D) [9; 5] E) $[\frac{19}{4}; 5]$

$$y = 5 - \frac{1}{4} \cdot 4 \sin^2 \alpha \cdot \cos^2 \alpha = 5 - \frac{1}{4} \sin^2 2\alpha$$

$$0 \leq \sin^2 2\alpha \leq 1$$

$$y = 5 - \frac{1}{4} \cdot 0 = 5 - 0 = 5 \text{ ƏBƏ} \quad \left[\frac{19}{4}; 5\right]$$

$$y = 5 - \frac{1}{4} \cdot 1 = 5 - \frac{1}{4} = \frac{20-1}{4} = \frac{19}{4} \text{ ƏKƏ}$$

236. $\operatorname{tg} \alpha = 2$ olduqda, $3 \sin^2 \alpha - 4 \cos \alpha \sin \alpha$ ifadəsinin qiymətini hesablayın.

- A) -2 B) 0,4 C) 0,8 D) 2 E) -0,6

$$3 \sin^2 \alpha - 4 \cos \alpha \sin \alpha = \frac{3 \sin^2 \alpha - 4 \cos \alpha \sin \alpha}{\sin^2 \alpha + \cos^2 \alpha} = \frac{\frac{3 \sin^2 \alpha}{\cos^2 \alpha} - \frac{4 \cos \alpha \sin \alpha}{\cos^2 \alpha}}{\frac{\sin^2 \alpha}{\cos^2 \alpha} + \frac{\cos^2 \alpha}{\cos^2 \alpha}} =$$

$$= \frac{3 \operatorname{tg}^2 \alpha - 4 \operatorname{tg} \alpha}{\operatorname{tg}^2 \alpha + 1} = \frac{3 \cdot 2^2 - 4 \cdot 2}{2^2 + 1} = \frac{12 - 8}{4 + 1} = \frac{4}{5} = 0,8$$

237. Hesablayın: $\frac{\sin^2 10^\circ - \cos^2 10^\circ}{4 \cos 20^\circ} = \frac{-\cos 20^\circ}{4 \cos 20^\circ} = -\frac{1}{4}$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $-\frac{1}{4}$ D) $-\frac{1}{2}$ E) 1

238. İfadəni sadələşdirin: $\frac{\sin \alpha - \sin 3\alpha}{\cos \alpha - \cos 3\alpha} \cdot (1 - \cos 4\alpha) =$

- A) $-\sin 4\alpha$ B) $\cos 4\alpha$ C) $\sin 2\alpha$ D) $\cos 2\alpha$ E) $\cos \alpha$

$$= \frac{2 \cos \frac{\alpha+3\alpha}{2} \cdot \sin \frac{\alpha-3\alpha}{2}}{-2 \sin \frac{\alpha+3\alpha}{2} \cdot \sin \frac{\alpha-3\alpha}{2}} \cdot (1 - \cos^2 2\alpha + \sin^2 2\alpha) =$$

$$= \frac{\cos 2\alpha}{-\sin 2\alpha} \cdot 2 \sin^2 2\alpha = -2 \sin 2\alpha \cdot \cos 2\alpha = -\sin 4\alpha$$

239. Hesablayın: $\operatorname{ctg} 15^\circ$.

- A) $2 - \sqrt{3}$ B) $2 + \sqrt{3}$ C) $1 + \sqrt{3}$ D) $\sqrt{3} - 1$ E) 2

$$\operatorname{ctg} 15^\circ = \sqrt{\frac{1 + \cos 30^\circ}{1 - \cos 30^\circ}} = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{1 - \frac{\sqrt{3}}{2}}} = \sqrt{\frac{2 + \sqrt{3}}{2 - \sqrt{3}}} =$$

$$= \sqrt{\frac{2 + \sqrt{3}}{2 - \sqrt{3}}} = \sqrt{\frac{(2 + \sqrt{3})(2 + \sqrt{3})}{(2 - \sqrt{3})(2 + \sqrt{3})}} = \sqrt{\frac{(2 + \sqrt{3})^2}{4 - 3}} = 2 + \sqrt{3}$$

240. Funksiyanın qiymətlər oblastını tapın: $y = \sin^2 \alpha \cdot \cos^2 \alpha + 3$.

- A) $[3; 3\frac{1}{4}]$ B) [3; 4] C) $[0; 3\frac{1}{4}]$ D) [0; 4] E) [0; 3]

$$y = \frac{1}{4} \cdot 4 \sin^2 \alpha \cdot \cos^2 \alpha + 3 = \frac{1}{4} \sin^2 2\alpha + 3$$

$$0 \leq \sin^2 2\alpha \leq 1$$

$$\frac{1}{4} \cdot 0 + 3 = 3$$

$$\frac{1}{4} \cdot 1 + 3 = \frac{1}{4} + 3 = 3\frac{1}{4}$$

$$[3; 3\frac{1}{4}]$$

241. $\alpha = \frac{\pi}{12}$ olduqda $\sqrt{2}(\sin \alpha + \cos \alpha)$ ifadəsinin qiymətini tapın.

- A) $\sqrt{2}$ B) $\sqrt{12}$ C) $\sqrt{\frac{3}{2}}$ D) $\sqrt{3}$ E) 1

$$\sqrt{2}(\sin \alpha + \cos \alpha) = \sqrt{2}(\sin \alpha + \sin(\frac{\pi}{2} - \alpha)) = \sqrt{2} \cdot 2 \sin \frac{\alpha + \frac{\pi}{2} - \alpha}{2} \cdot \cos \frac{\alpha - \frac{\pi}{2} + \alpha}{2} =$$

$$= 2\sqrt{2} \sin \frac{\pi}{4} \cdot \cos(\alpha - \frac{\pi}{4}) = 2\sqrt{2} \cdot \frac{1}{\sqrt{2}} \cdot \cos(\alpha - \frac{\pi}{4}) = 2 \cos(\alpha - \frac{\pi}{4}) =$$

$$= 2 \cos(\frac{\pi}{12} - \frac{\pi}{4}) = 2 \cos \frac{\pi - \pi}{12} = 2 \cos \frac{-\pi}{12} = 2 \cos \frac{\pi}{12} = 2 \cos \frac{\pi}{6} = 2 \cdot \frac{\sqrt{3}}{2} = \sqrt{3}$$

242. İfadəni sadələşdirin:

$$0(3) = \frac{3}{9} = \frac{1}{3}$$

$$(0, (3) + \sin \alpha)(0, (3) - \sin \alpha) + (\frac{2\sqrt{2}}{3} + \cos \alpha)(\frac{2\sqrt{2}}{3} - \cos \alpha) =$$

- A) -1 B) $\frac{1}{3}$ C) 1 D) $\frac{1}{9}$ E) 0

$$= (\frac{1}{3} + \sin \alpha)(\frac{1}{3} - \sin \alpha) + (\frac{2\sqrt{2}}{3})^2 - \cos^2 \alpha = (\frac{1}{3})^2 - \sin^2 \alpha + \frac{8}{9} - \cos^2 \alpha =$$

$$= \frac{1}{9} + \frac{8}{9} - (\sin^2 \alpha + \cos^2 \alpha) = \frac{9}{9} - 1 = 1 - 1 = 0$$

243. İfadəni sadələşdirin: $\sin^6 \alpha + \cos^6 \alpha + 3 \sin^2 \alpha \cdot \cos^2 \alpha =$

- A) -2 B) -1 C) 0 D) 1 E) 2

$$= (\sin^2 \alpha)^3 + (\cos^2 \alpha)^3 + 3 \sin^2 \alpha \cdot \cos^2 \alpha = (\sin^2 \alpha + \cos^2 \alpha)(\sin^4 \alpha - \sin^2 \alpha \cos^2 \alpha + \cos^4 \alpha + \cos^2 \alpha) + 3 \sin^2 \alpha \cdot \cos^2 \alpha =$$

$$= (\sin^2 \alpha + \cos^2 \alpha)(\sin^4 \alpha - \sin^2 \alpha \cos^2 \alpha + \cos^4 \alpha + 3 \sin^2 \alpha \cos^2 \alpha) =$$

$$= (\sin^2 \alpha + \cos^2 \alpha)(\sin^4 \alpha + 2 \sin^2 \alpha \cos^2 \alpha + \cos^4 \alpha) = (\sin^2 \alpha + \cos^2 \alpha)^2 = 1^2 = 1$$

244. $\sin 14^\circ = a$ olduqda $\sin^2 38^\circ$ -ni tapın.

- A) $\frac{a-1}{2}$ B) $\frac{a}{2}$ C) $\frac{a-2}{2}$ D) $\frac{1-a}{2}$ E) $\frac{2-a}{2}$

$$\sin^2 38^\circ = \frac{1 - \cos 2 \cdot 38^\circ}{2} = \frac{1 - \cos 76^\circ}{2} = \frac{1 - \cos(90^\circ - 14^\circ)}{2} = \frac{1 - \sin 14^\circ}{2} =$$

$$= \frac{1-a}{2}$$

TRİQONOMETRİK FUNKSİYALAR

245. $y = 3 - 2 \sin^2 3x$ funksiyasının ən böyük və ən kiçik qiymətlərinin cəmini tapın.
A) 6 B) 9 C) 3 D) 4 E) 8

$$0 \leq \sin^2 3x \leq 1$$

$$3 - 2 \cdot 0 = 3 \text{ ƏBƏ}$$

$$3 - 2 \cdot 1 = 3 - 2 = 1 \text{ ƏKƏ}$$

$$3 + 1 = 4$$

246. İfadəni sadələşdirin: $\sin^4 \alpha + \cos^4 \alpha + \frac{1}{2}(-\cos^2 \alpha + 1) =$
A) 1 B) -1 C) $\frac{1}{2}$ D) $\sin 2\alpha$ E) $\cos 2\alpha$

$$= \sin^4 \alpha + 2 \sin^2 \alpha \cos^2 \alpha + \cos^4 \alpha - 2 \sin^2 \alpha \cos^2 \alpha + \frac{1}{2} (1 - \cos^2 \alpha)$$

$$= (\sin^2 \alpha + \cos^2 \alpha)^2 - 2 \sin^2 \alpha \cos^2 \alpha + \frac{1}{2} \sin^2 \alpha =$$

$$= 1 - 2 \sin^2 \alpha \cos^2 \alpha + \frac{1}{2} \sin^2 \alpha = 1 - \frac{1}{2} 4 \sin^2 \alpha \cos^2 \alpha + \frac{1}{2} \sin^2 \alpha =$$

$$= 1 - \frac{1}{2} \sin^2 2\alpha + \frac{1}{2} \sin^2 2\alpha = 1$$

247. $\cos 70^\circ = b$ olduqda $\sin^2 35^\circ$ -ni hesablayın

- A) $\frac{1-b}{2}$ B) $\frac{1+b}{2}$ C) $\frac{b}{2}$ D) $1 - \frac{b}{2}$ E) $1 + \frac{b}{2}$

$$\sin^2 35^\circ = \sin^2 \frac{70^\circ}{2} = \frac{1 - \cos 70^\circ}{2} = \frac{1-b}{2}$$

248. $y = 1 + 2 \cos^2 x$ funksiyasının qiymətlər oblas tını tapın.
A) $[-1; 3]$ B) $[1; 3]$ C) $[1; 2]$ D) $[0; 1]$ E) $[2; 4]$

$$0 \leq \cos^2 x \leq 1$$

$$1 + 2 \cdot 0 = 1 \text{ ƏKƏ}$$

$$1 + 2 \cdot 1 = 3 \text{ ƏBƏ} \quad [1; 3]$$

249. $y = 4 - 2 \sin x$ funksiyasının qiymətlər oblas tını tapın.
A) $[2; 6]$ B) $[2; 4]$ C) $[-2; 3]$ D) $[4; 6]$ E) $[4; 8]$

$$-1 \leq \sin x \leq 1$$

$$4 - 2(-1) = 4 + 2 = 6 \text{ ƏBƏ}$$

$$4 - 2 \cdot 1 = 4 - 2 = 2 \text{ ƏKƏ}$$

$$[2; 6]$$

250. k -parametri nin hansı qiym ətində

$$2 \sin 6x (\sin^4 3x - \cos^4 3x) = \sin kx \text{ bərabərliyi eynilidir?}$$

- A) -12 B) 12 C) 6 D) -6 E) -3

$$2 \sin 6x \cdot (\sin^2 3x - \cos^2 3x) (\sin^2 3x + \cos^2 3x) = \sin kx$$

$$2 \sin 6x \cdot (-\cos 6x) \cdot 1 = \sin kx$$

$$- \sin 12x = \sin kx$$

$$\sin (-12)x = \sin kx$$

$$k = -12$$

251. $2 \sin 4x (\cos^4 2x - \sin^4 2x) = \sin kx$ bərabərliyi k -nin hansı qiymətində eynilik olar?

- A) 2 B) 4 C) 6 D) 8 E) -8

$$2 \sin 4x (\cos^2 2x - \sin^2 2x) (\cos^2 2x + \sin^2 2x) = \sin kx$$

$$2 \sin 4x \cdot \cos 4x \cdot 1 = \sin kx$$

$$\sin 8x = \sin kx$$

$$k = 8$$