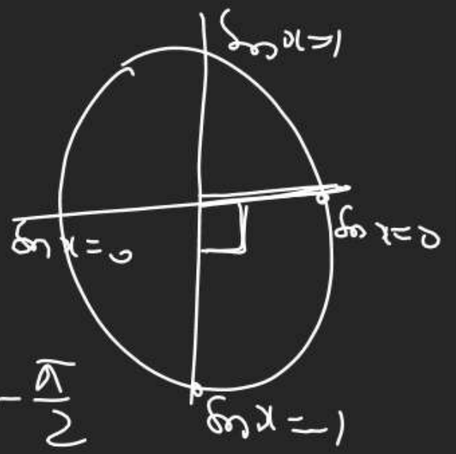
Nishant Jindal

Q48 Done

Q49 $2\sin^2 x + \sin x - 1 = 0$ $\quad 0 \le x \le 2\pi$

$(2\sin x - 1)(\sin x + 1) = 0$

Pr. Sol.



$2\sin x - 1 = 0$ or $\sin x = -1$

$\sin x = \frac{1}{2}$ or $\sin x = -1$

Sol.

$\sin x = \sin\frac{\pi}{6}$ or $x = 2n\pi - \frac{\pi}{2}$

$x = n\pi + (-1)^n \frac{\pi}{6}$

$n = 0 \quad x = -\frac{\pi}{2}$ ✗

$n = 0 \quad x = \frac{\pi}{6}$ ✓

$n = 1 \quad x = 2\pi - \frac{\pi}{2} = \frac{3\pi}{2}$ ✓

$n = 1 \quad x = \pi - \frac{\pi}{6}$ ✓

$n = 2 \quad x = 2\pi + \frac{\pi}{6}$ ✗

$0 \le x \le 2\pi$

Q50 $5\sin^2 x + 7\sin x - 6 = 0$

$5\sin^2 x + 10\sin x - 3\sin x - 6 = 0$

$5\sin x(\sin x + 2) - 3(\sin x + 2) = 0$

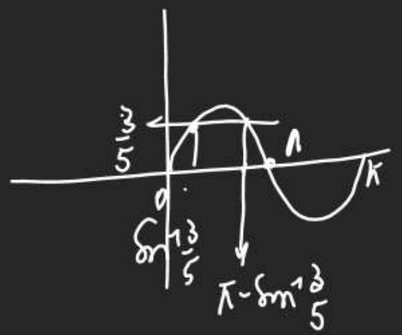
$(\sin x + 2)(5\sin x - 3) = 0$

$\sin x = -2$ or $\sin x = \frac{3}{5}$

✗

Not Poss.

$x = n\pi + (-1)^n \cdot \alpha$



Where $\alpha = \sin^{-1}\frac{3}{5}$

$x = n\pi + (-1)^n \cdot \sin^{-1}\frac{3}{5}$

$x = \sin^{-1}\frac{3}{5}$ ✓

$x = \pi - \sin^{-1}\frac{3}{5}$ ✓

} 2 Sol.

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$0 \le x \le 2\pi$

Q51 $\sin^2 x - \cos x = \frac{1}{4}$

$(1-\cos^2 x) - \cos x = \frac{1}{4}$

$4 - 4\cos^2 x - 4\cos x = 1$

$4\cos^2 x + 4\cos x - 3 = 0$

$4\cos^2 x + 6\cos x - 2\cos x - 3 = 0$

$2\cos x(2\cos x + 3) - 1(2\cos x + 3) = 0$

$(2\cos x - 1)(2\cos x + 3) = 0$

$2\cos x - 1 = 0$ OR $2\cos x + 3 = 0$

$\cos x = \frac{1}{2}$ OR $\cos x = -\frac{3}{2} = -1.5$ ✗

$[-1, 1]$

$\cos x = \cos\frac{\pi}{3}$

$x = 2n\pi \pm \frac{\pi}{3}$

$[0, 2\pi)$

$n=0$: $x = +\frac{\pi}{3}$ ✓, $-\frac{\pi}{3}$ ✗

$n=1$: $x = 2\pi - \frac{\pi}{3}$ ✓, $2\pi + \frac{\pi}{3}$ ✗

$0 \le x \le 2\pi$

Q52 $\tan^2 x - 2\tan x - 3 = 0$

$\tan^2 x - 3\tan x + \tan x - 3 = 0$

$\tan x(\tan x - 3) + 1(\tan x - 3) = 0$

$(\tan x + 1)(\tan x - 3) = 0$

$\tan x + 1 = 0$ OR $\tan x - 3 = 0$

$\tan x = -1$ OR $\tan x = 3$ → यहाँ आता है पर नहीं आता

$\tan x = \tan\left(-\frac{\pi}{4}\right)$ ($1 \to \frac{\pi}{4}$)

$x = n\pi + \alpha$

$\alpha = \tan^{-1} 3$

$x = n\pi - \frac{\pi}{4}$

$x = n\pi + \tan^{-1} 3$

$n=0$: $x = -\frac{\pi}{4}$ ✗

$n=1$: $x = \pi - \frac{\pi}{4}$ ✓

$n=2$: $x = 2\pi - \frac{\pi}{4}$ ✓

$n=0$: $x = \tan^{-1} 3$ ✓

$n=1$: $x = \pi + \tan^{-1} 3$ ✓

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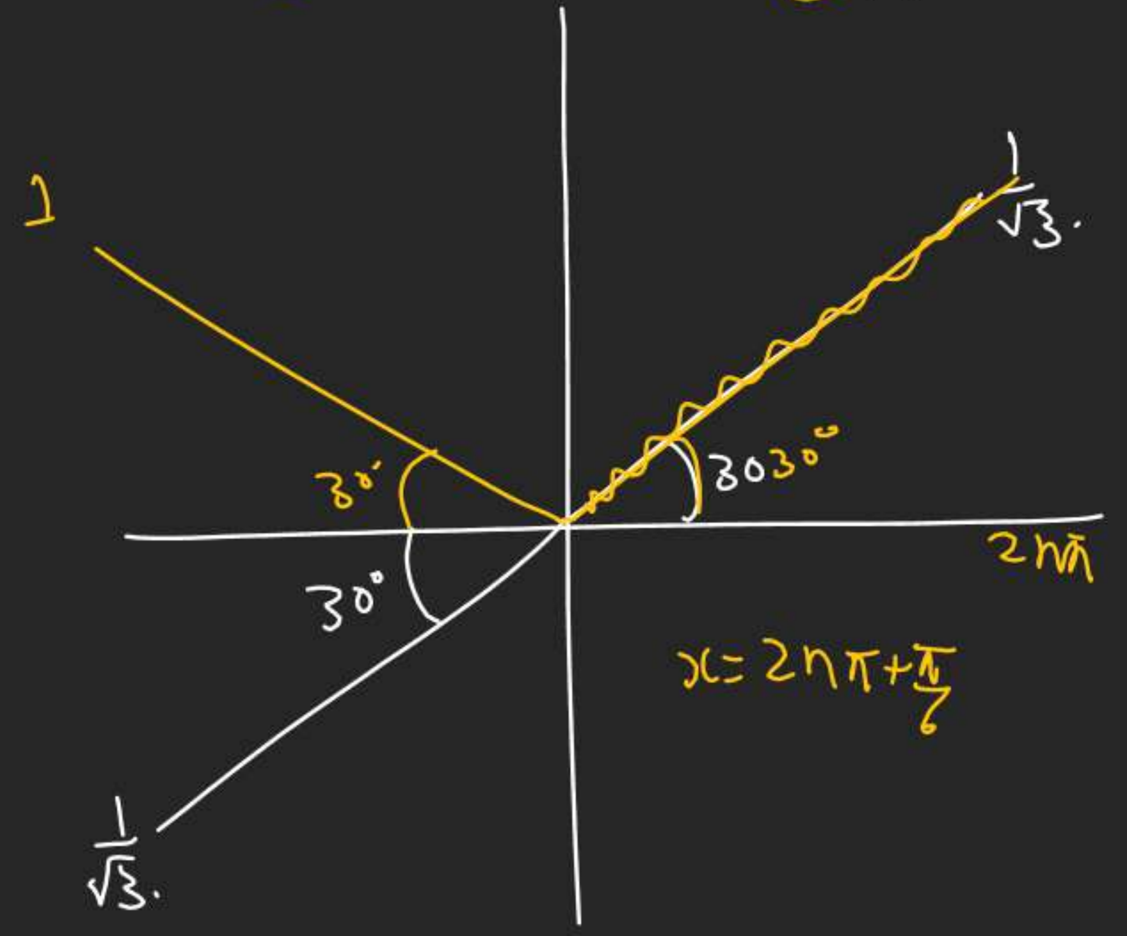
36 $\sin\theta = \frac{1}{2}$ & $\tan\theta = \frac{1}{\sqrt{3}}$

$= 30^\circ$ (1st/2nd) $\quad 30^\circ$ (1st/3rd)



$x = 2n\pi + \frac{\pi}{6}$

T2 Remaining Qs.

Q $2\cos x \cdot \cos 2x = \cos x$ find Pr. Sol.

$\cos x(2\cos 2x - 1) = 0$

$\cos x = 0$ OR $\cos 2x = \frac{1}{2}$

$x = (2n+1)\frac{\pi}{2}$ OR $\cos 2x = \cos\frac{\pi}{3}$

$x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

6 Pr. sol.

$2x = 2n\pi \pm \frac{\pi}{3}$

$x = n\pi \pm \frac{\pi}{6}$

$\frac{\pi}{6}, -\frac{\pi}{6}$ (X) | $\pi + \frac{\pi}{6}, \pi - \frac{\pi}{6}$ | $2\pi - \frac{\pi}{6}$, $2\pi + \frac{\pi}{6}$ (X)

$\sin\theta = \sin\alpha$

$\theta = n\pi + (-1)^n\alpha$

$\cos\theta = \cos\alpha$

$\theta = 2n\pi \pm \alpha$

$\tan\theta = \tan\alpha$

$\theta = n\pi + \alpha$

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Q 3 $\cos^2 x - 10\cos x + 3 = 0$ Pr.Sol.?

$3\cos^2 x - 9\cos x - \cos x + 3 = 0$

$3\cos x(\cos x - 3) - 1(\cos x - 3) = 0$

$(3\cos x - 1)(\cos x - 3) = 0$

$\cos x = \frac{1}{3}$ OR $\cos x = 3$ ⊗ $[-1, 1]$

$x = 2n\pi \pm \cos^{-1}\frac{1}{3}$

$n = 0$ $x = \cos^{-1}\frac{1}{3}, -\cos^{-1}\frac{1}{3}$ ⊗

$n = 1$ $x = 2\pi - \cos^{-1}\frac{1}{3}, 2\pi + \cos^{-1}\frac{1}{3}$ ⊗

T3 Try to make all Trigo Eqn of one Variable

Q $3\sin^2 x - \sin x \cdot \cos x - 4\cos^2 x = 0$ find G.V. of x?

$\div \cos^2 x$

$3\tan^2 x - \tan x - 4 = 0$

$3\tan^2 x - 4\tan x + 3\tan x - 4 = 0$

$\tan x(3\tan x - 4) + 1(3\tan x - 4) = 0$

$(\tan x + 1)(3\tan x - 4) = 0$

$\tan x = -1$ OR $\tan x = \frac{4}{3}$

$\tan x = \tan\left(-\frac{\pi}{4}\right)$ → $x = n\pi - \frac{\pi}{4}$

$x = n\pi + \tan^{-1}\frac{4}{3}$

1) $\sin x$, $\cos x$ Both are given

2) try to make 2 different Trigo fxn into one fxn.

(3) ** ÷ by $\cos^2 x$

(4) Pre cautions

Note: $\cos^2 x$ can not be Zero.

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Q $(1-\tan\theta)(1+\sin 2\theta) = (1+\tan\theta)$ find θ.

1) 2 different variables are given

$$(1-\tan\theta)\left(1+\frac{2\tan\theta}{1+\tan^2\theta}\right) = (1+\tan\theta)$$

$$(1-\tan\theta)\left(\frac{1+\tan^2\theta+2\tan\theta}{1+\tan^2\theta}\right) = 1+\tan\theta$$

$$\frac{(1-\tan\theta)(1+\tan\theta)^2}{1+\tan^2\theta} = (1+\tan\theta)$$

$$\Rightarrow \frac{(1+\tan\theta)^2\cdot(1-\tan\theta)}{1+\tan^2\theta} - (1+\tan\theta) = 0$$

$$\Rightarrow (1+\tan\theta)\left\{\frac{(1+\tan\theta)(1-\tan\theta)}{1+\tan^2\theta} - 1\right\} = 0$$

$$\Rightarrow (1+\tan\theta)\left\{\frac{1-\tan^2\theta - 1-\tan^2\theta}{1+\tan^2\theta}\right\} = 0$$

$$\Rightarrow (1+\tan\theta)\times\frac{2\tan^2\theta}{(1+\tan^2\theta)} = 0$$

$$\Rightarrow (1+\tan\theta)\times\tan^2\theta = 0$$

$$\Rightarrow \tan^2\theta = 0 \quad \text{OR} \quad 1+\tan\theta = 0$$

$\tan\theta = 0$

$\theta = n\pi + 0$

$\tan\theta = -1$

$\tan\theta = \tan\left(-\frac{\pi}{4}\right)$

$\theta = n\pi - \frac{\pi}{4}$

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$\tan^2 x = \tan^2 \alpha$

$x = n\pi \pm \alpha$

Q $\cos 4x + 6 = 7\cos 2x$ find g.s.

① One var. is $\cos 2x$

Another in $\cos 4x$

2) $\cos 2\theta = 2\cos^2\theta - 1$

$\cos 4\theta = 2\cos^2(2\theta) - 1$

$2\cos^2(2x) - 1 + 6 = 7\cos 2x$

$2\cos^2(2x) - 7\cos 2x + 5 = 0$

$2\cos^2 2x - 2\cos 2x - 5\cos 2x + 5 = 0$

$2\cos 2x(\cos 2x - 1) - 5(\cos 2x - 1) = 0$

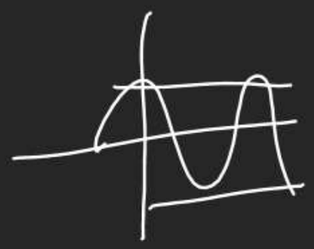
$(2\cos 2x - 5)(\cos 2x - 1) = 0$

$2\cos 2x - 5 = 0$ OR $\cos 2x - 1 = 0$

$\cos 2x = \frac{5}{2} = 2.5$ OR $\cos 2x = 1$ (Std case)

$2x = 2n\pi \pm 0$

$x = n\pi$



Q $5\tan^4 x - \sec^4 x = 29$ find g.s.?

$5\tan^4 x - (1 + \tan^2 x)^2 = 29$

$5\tan^4 x - (1 + 2\tan^2 x + \tan^4 x) = 29$

$4\tan^4 x - 2\tan^2 x - 30 = 0$

$2\tan^4 x - \tan^2 x - 15 = 0$

$2\tan^4 x - 6\tan^2 x + 5\tan^2 x - 15 = 0$

$2\tan^2 x(\tan^2 x - 3) + 5(\tan^2 x - 3) = 0$

$(2\tan^2 x + 5)(\tan^2 x - 3) = 0$

$\tan^2 x = -\frac{5}{2}$ (+) (−) (X)

OR $\tan^2 x = 3 = (\sqrt{3})^2$

$\tan^2 x = \tan^2 \frac{\pi}{3}$

$x = n\pi \pm \frac{\pi}{3}$

1) $\tan x, \sec x$ 2 diff variable. Make them one

2) $\sec^2\theta = 1 + \tan^2\theta$

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Q $5\cos 2x + 2\cos^2\left(\frac{x}{2}\right) + 1 = 0$

Recall

① $2\cos^2\theta = 1 + \cos 2\theta$

$2\cos^2\left(\frac{x}{2}\right) = 1 + \cos x$

② $\cos 2x$ को $\cos x$ में convert करेंगे।

$\cos 2x = 2\cos^2 x - 1$

$5\cos 2x + 1 + \cos x + 1 = 0$

$5(2\cos^2 x - 1) + \cos x + 2 = 0$

$10\cos^2 x + \cos x - 3 = 0$

$10\cos^2 x + 6\cos x - 5\cos x - 3 = 0$

$2\cos x(5\cos x + 3) - 1(5\cos x + 3) = 0$

$(2\cos x - 1)(5\cos x + 3) = 0$

$2\cos x - 1 = 0$ OR $5\cos x + 3 = 0$

$\cos x = \frac{1}{2}$ OR $\cos x = -\frac{3}{5} = -0.6 \in [-1, 1]$

$\cos x = \cos\frac{\pi}{3}$

$x = 2n\pi \pm \frac{\pi}{3}$ OR $x = 2n\pi \pm \cos^{-1}\left(-\frac{3}{5}\right)$

HW

Q 37, 38, 39, 40 ——— 47

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Discriminant Ex 2

$|a-b| = 2|c-d|$ Sq

$(a-b)^2 = 4(c-d)^2 \Rightarrow ((a+b)^2 - 4ab) = 4\{(c+d)^2 - 4cd\}$

Q 15 $(P-3)x^2 - 2Px + 5P = 0$ $P = ?$

19) $x^2 + 3x - k = 0$ → a, b; $a+b=-3$, $a \cdot b = -k$

$x^2 + 3x - 10 = 0$ → c, d

Real ↓ $D \geq 0$

$4P^2 - 4 \times (P-3) \times 5P \geq 0$

$P^2 - 5P^2 + 15P \geq 0$

$-4P^2 + 15P \geq 0$

$4P^2 - 15P \leq 0$

$(P)(4P-15) \leq 0$

$0 \leq P \leq \frac{15}{4}$

+ve Root

α, β +ve

$\alpha + \beta =$ +ve

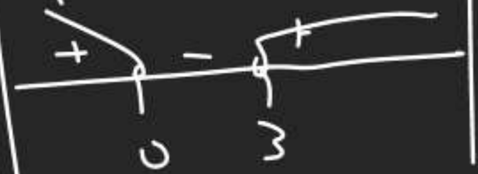
$-\frac{b}{2a} > 0$

$\frac{2P}{2(P-3)} > 0$

$\alpha\beta = \oplus$

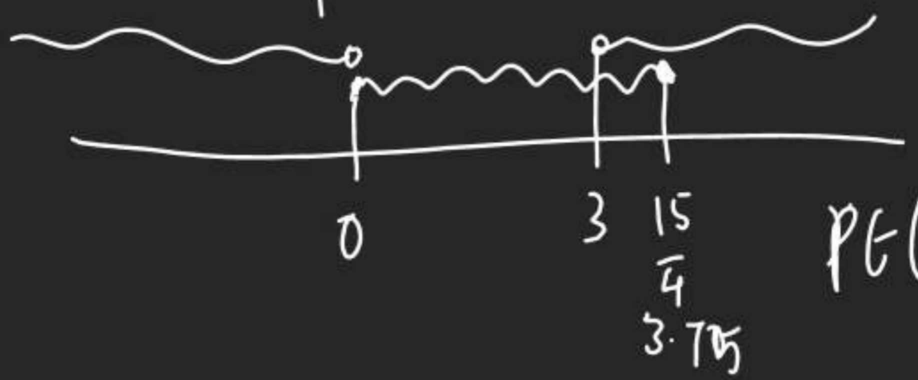
$\frac{c}{a} > 0$

$\frac{5P}{(P-3)} > 0$



Q 17 Copy

Q 18 Copy



$P \in (3, \frac{15}{4}]$

Q $\xi < 0 \rightarrow a < 0$; $D < 0$

16) $(a+4)x^2 - 2ax + 2a - 6 < 0$

$a + 4 < 0$ & $D < 0$

$a < -4$

$4a^2 - 4 \times (a+4)(2a-6) < 0$

$a^2 - 2a^2 - 2a + 24 < 0$

$-a^2 - 2a + 24 < 0$

$a^2 + 2a - 24 > 0$

$(a+6)(a-4) > 0$

~~$a < 4$ $a > 6$~~

$a < -6 \cup a > 4$

~~$a \in (-\infty, -4)$~~

$a \in (-\infty, -6)$

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20)

$$(-14+11)(-22m+\overset{14}{\cancel{28}}m) = (2m-m)^2$$

$$-3 \times -8m = m^2$$

$$m^2 + 24m = 0$$

$$m = 0, -24$$