Nishant Jindal

SL Loney Ex 11

Q 17 $\csc^2\theta = \frac{4}{3}$

$\sin^2\theta = \frac{3}{4}$

$\sin^2\theta = \left(\frac{\sqrt{3}}{2}\right)^2$

$\sin^2\theta = \sin^2\frac{\pi}{6}$

$\boxed{\theta = n\pi \pm \frac{\pi}{6}}$

$\sin^2\theta = \sin^2\alpha$

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

(16) $2\cot^2\theta = \csc^2\theta$

$2\cot^2\theta = 1 + \cot^2\theta$

$\cot^2\theta = 1$

$\tan^2\theta = 1$

$\tan^2\theta = \tan^2\frac{\pi}{4}$

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

(8) $\tan\theta = -1$

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

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

Q. Eqn.

Ex 1

12, 15, 19, 20, 17

Ex 2

13-30

Nishant Jindal

Proof of $\sin^2\theta = \sin^2\alpha$

$$\frac{1-\cos 2\theta}{2} = \frac{1-\cos 2\alpha}{2}$$

$$\cancel{1}-\cos 2\theta = \cancel{1}-\cos 2\alpha.$$

$$\cos 2\theta = \cos 2\alpha.$$

$\cos\theta = \cos\alpha.$

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

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

$$\boxed{\theta = n\pi \pm \alpha}$$

Proof of $\cos^2\theta = \cos^2\alpha$

$$\frac{1+\cos 2\theta}{\cancel{2}} = \frac{1+\cos 2\alpha}{\cancel{2}}$$

$$\cancel{1}+\cos 2\theta = \cancel{1}+\cos 2\alpha$$

$$\cos 2\theta = \cos 2\alpha.$$

$$\cancel{2}\theta = \cancel{2}n\pi \pm \cancel{2}\alpha$$

$$\boxed{\theta = n\pi \pm \alpha}$$

Proof of $\tan^2\theta = \tan^2\alpha$

$$\frac{\tan^2\theta}{1} = \frac{\tan^2\alpha}{1}$$

$$\frac{1}{\tan^2\theta} = \frac{1}{\tan^2\alpha}$$

C&D

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

$$\cos 2\theta = \cos 2\alpha.$$

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

$$\boxed{\theta = n\pi \pm \alpha}$$

Nishant Jindal

Solution.

2 type

- Principle Solution: $\theta \in [0, 2\pi)$ में
- General Sol. (4 types)

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

$\cos\theta = \cos\alpha \rightarrow \theta = 2n\pi \pm \alpha.$

$\tan\theta = \tan\alpha \rightarrow \theta = n\pi + \alpha.$

$$\boxed{\begin{matrix}\sin^2\theta = \sin^2\alpha.\\ \cos^2\theta = \cos^2\alpha.\\ \tan^2\theta = \tan^2\alpha.\end{matrix}} \rightarrow \theta = n\pi \pm \alpha.$$

Type 1 (When 2 Trigo fxn are Simultaneously Solved)

Q $\left(\sin\theta + \frac{1}{2}\right)^2 + \left(\tan\theta - \frac{1}{\sqrt{3}}\right)^2 = 0$ find G.S. ?

Do +ve Quantities का sum = 0 given

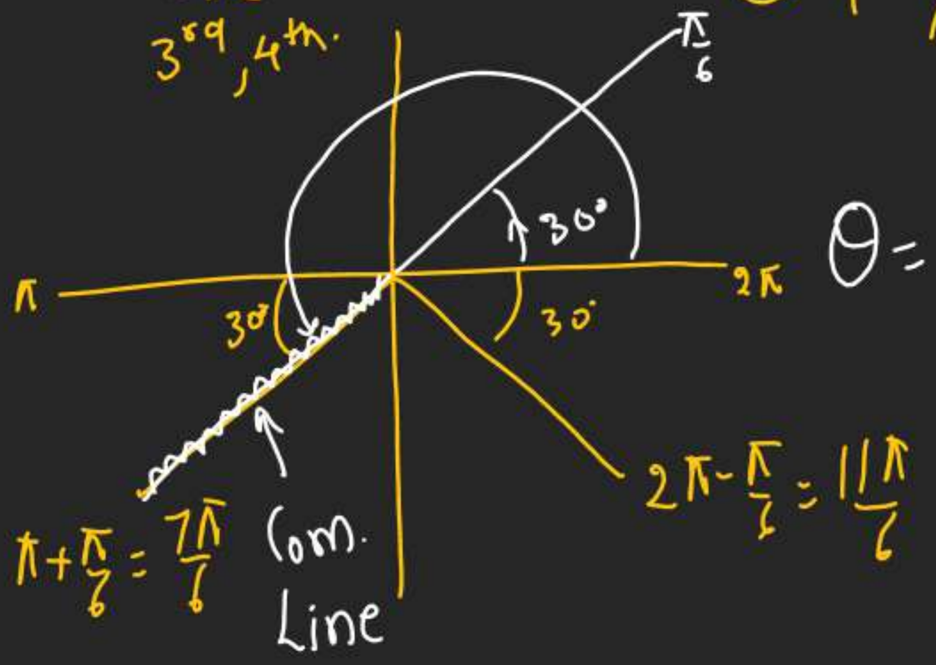
$\sin\theta + \frac{1}{2} = 0$ & $\tan\theta - \frac{1}{\sqrt{3}} = 0$ (जबरदस्ती)

$\sin\theta = -\boxed{\frac{1}{2}}$ & $\tan\theta = \boxed{\frac{1}{\sqrt{3}}}$ 30°

30°

-ve: 3rd, 4th.

+ 1st / 3rd



$$\theta = 2n\pi + \frac{7\pi}{6}$$

Ans

Nishant Jindal

Q $\left(\sin x - \frac{\sqrt{3}}{2}\right)^2 + \left(\cos x + \frac{1}{2}\right)^2 = 0$

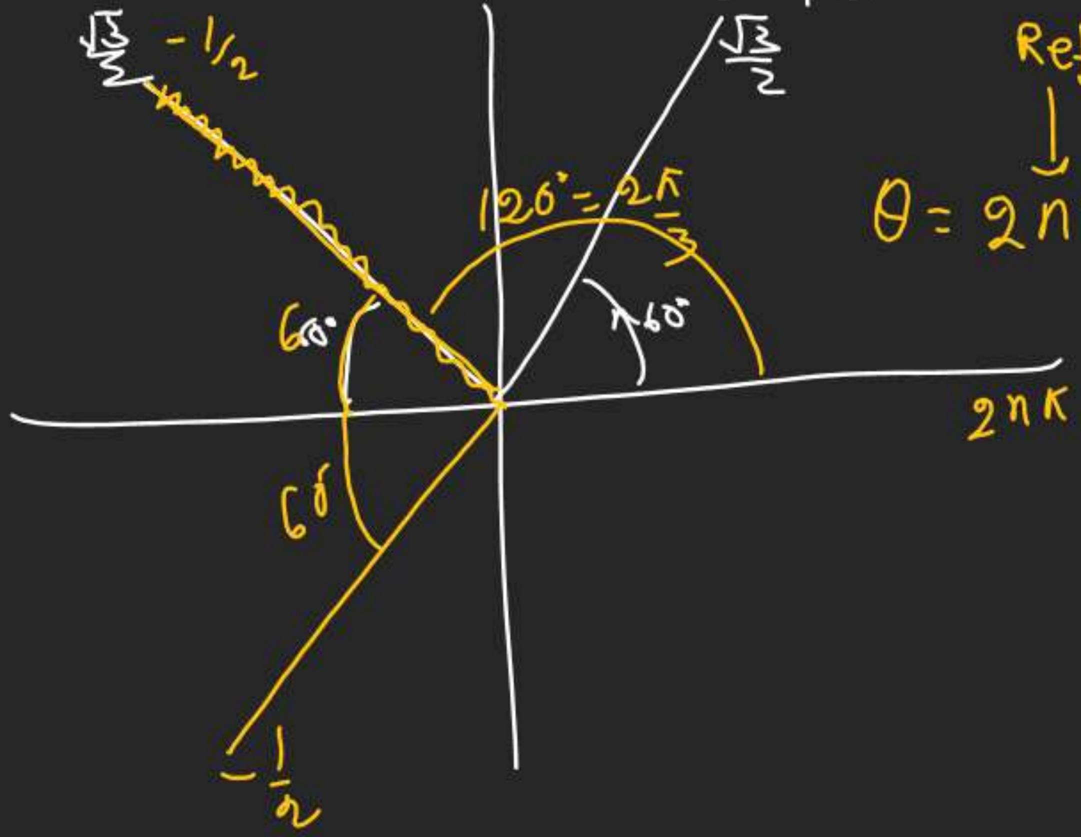
No +ve का Sum = 0 given ⇒ दोनों Zero

$\sin x - \frac{\sqrt{3}}{2} = 0$ & $\cos x + \frac{1}{2} = 0$

$\sin x = \boxed{\frac{\sqrt{3}}{2}}$ & $\cos x = -\boxed{\frac{1}{2}}$

60° 60°

+ 1st/2nd   -ve 2nd/3rd



Ref. Line से

$\frac{2\pi}{3}$ आगे

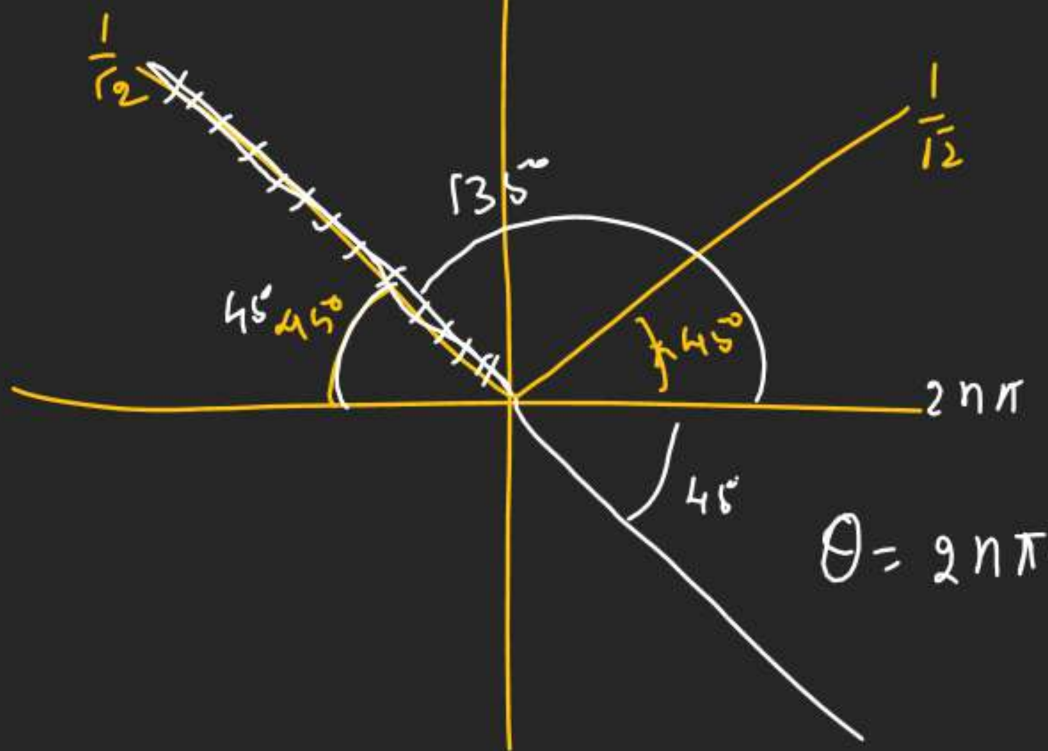
$\theta = 2n\pi + \frac{2\pi}{3}$

Q If $\sin\theta = \frac{1}{\sqrt{2}}$ & $\tan\theta = -1$ find G.V. of θ.

$\sin\theta = \boxed{\frac{1}{\sqrt{2}}}$ & $\tan\theta = -\boxed{1}$

+ve 1st/2nd   45°

-ve 2nd/4th   45°



$\theta = 2n\pi + \frac{3\pi}{4}$

Nishant Jindal

Q Principle Value of $\sin\theta = -\frac{1}{2}$

$\downarrow$

$\theta \in [0, 2\pi)$

$\sin\theta = -\boxed{\frac{1}{2}}$

$\rightarrow 30^\circ = \frac{\pi}{6}.$

$\sin\theta = \sin\left(-\frac{\pi}{6}\right)$

$\theta = \underline{n\pi} + (-1)^n \cdot \left(-\frac{\pi}{6}\right)$

$n = 0 \quad \theta = 0 + (-1)^0 \cdot \left(-\frac{\pi}{6}\right) = -\frac{\pi}{6} \in [0, 360^\circ)$

$n = 1 \quad \theta = \pi + (-1)^1 \left(-\frac{\pi}{6}\right) = \pi + 1 \times + \frac{\pi}{6} = \pi + \frac{\pi}{6} \in [0, 360^\circ)$

210°

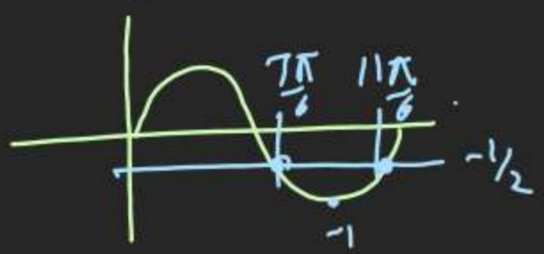
$n = 2 \quad \theta = 2\pi + (-1)^2 \cdot \left(-\frac{\pi}{6}\right) = 2\pi - \frac{\pi}{6} \in [0, 360^\circ)$

330° ✓

$n = 3 \quad \theta = \underline{3\pi} + \frac{\pi}{6} \in [0, 2\pi)$

(X)

Adv



$\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$

Q Pr. value of $\sin\theta = \frac{1}{\sqrt{2}}$

$\sin\theta = \sin\frac{\pi}{4}$

$\theta = n\pi + (-1)^n \frac{\pi}{4}$

$n = 0 \rightarrow \theta = 0 + (-1)^0 \cdot \frac{\pi}{4} = \frac{\pi}{4}$ ✓ $\in [0, 360^\circ)$

$n = 1 \rightarrow \theta = \pi - \frac{\pi}{4} \in [0, 2\pi)$

$n = 2 \rightarrow \theta = 2\pi + (-1)^2 \cdot \frac{\pi}{4}$

(X) $= 2\pi + \frac{\pi}{4} \in [0, 2\pi)$

$\therefore \theta = \frac{\pi}{4}, \frac{3\pi}{4}$

$\sin\theta = \sin\boxed{\alpha}$

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

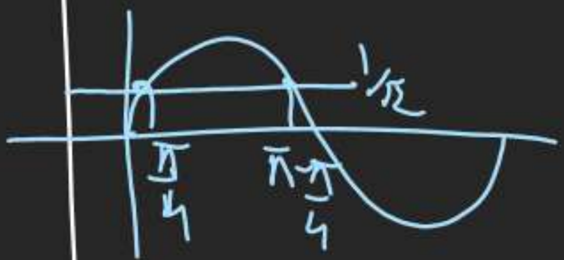
$[-90^\circ, 90^\circ]$

$\cos\theta = \cos\boxed{\alpha}$

$[0, 180^\circ]$

$\tan\theta = \tan\boxed{\alpha}$

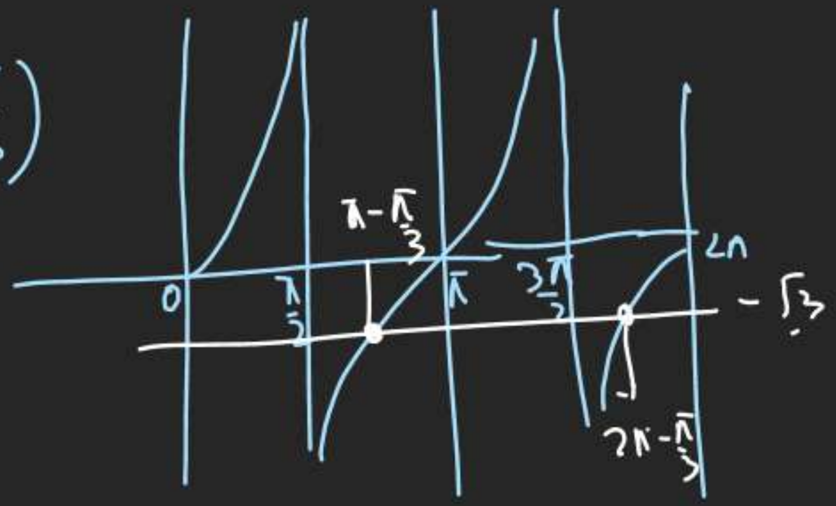
$(-90^\circ, 90^\circ)$



Nishant Jindal

Q Pr. value of $\tan\theta = -\sqrt{3}$ $\quad \tan 60^\circ$

$$\tan\theta = \tan\left(-\frac{\pi}{3}\right)$$



$$\theta = n\pi - \frac{\pi}{3}$$

$n=0$
$\theta = -\frac{\pi}{3} \in [0, 2\pi)$ ×

$n=1$
$\theta = \pi - \frac{\pi}{3} \in [0, 2\pi) \rightarrow \frac{2\pi}{3}$ ✓

$n=2$ $\quad \theta = 2\pi - \frac{\pi}{3} \in [0, 2\pi)$ ✓ $\rightarrow \frac{5\pi}{3}$

$n=3$ $\quad \theta = 3\pi - \frac{\pi}{3} \in [0, 2\pi)$ ×

$$\theta = \frac{2\pi}{3}, \frac{5\pi}{3}$$

Q Pr. Value of $\sec\theta = \sqrt{2}$

$$\cos\theta = \frac{1}{\sqrt{2}} = \cos\frac{\pi}{4}$$

$$\theta = 2n\pi \pm \frac{\pi}{4}$$

$n=0$
$\theta = \pm\frac{\pi}{4}$ → $\boxed{\frac{\pi}{4}} \in [0, 2\pi)$ ✓
→ $-\frac{\pi}{4} \in [0, 2\pi)$ ×

$n=1$
$\theta = 2\pi \pm \frac{\pi}{4}$ → $2\pi + \frac{\pi}{4} \in [0, 2\pi)$ ×
→ $\boxed{2\pi - \frac{\pi}{4}} \in [0, 2\pi)$ ✓

$$\theta = \frac{\pi}{4}, 2\pi - \frac{\pi}{4}$$

Nishant Jindal

T2 Factorise the eqn

Q $\cos x \cdot \boxed{\cot x} - \cos x + \cot x - 1 = 0$

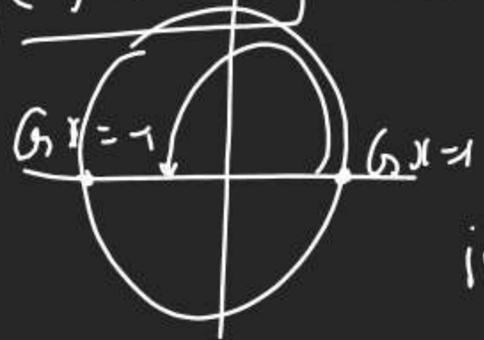
$\cos x(\cot x - 1) + 1(\cot x - 1) = 0$

$(\cot x - 1)(\cos x + 1) = 0$

$\cot x - 1 = 0$ or $\cos x + 1 = 0$

$\cot x = 1$ or $\boxed{\cos x = -1} \rightarrow \sin x = 0$

$\tan x = 1$ or



$\tan x = \tan \frac{\pi}{4}$

$\boxed{x = n\pi + \frac{\pi}{4}}$ or. $x = 2n\pi + \pi$ X

Ans

Concept

$\cot x = \frac{\cos x}{\sin x} = \frac{-1}{0} \rightarrow \infty$

Undefined

in Qs of tan x & cot always check value of x so that no value can come into Answer in where tan x & cot x are undefined

Nishant Jindal

Q $(2\sin x-\cos x)(1+\cos x)=\sin^2 x$ find general & Pr. Sol?

App Note → (HP)

HW

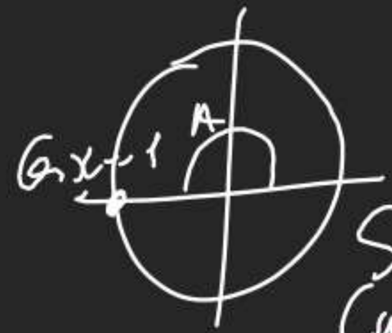
1) 25 - 36
2) 48 - 53

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

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

$(1+\cos x)\{2\sin x-\cancel{\cos x}-1+\cancel{\cos x}\}=0$

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



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

Spl. Case $\cos x=-1$ $\qquad$ $\sin x=\frac{1}{2}=\sin\frac{\pi}{6}$

$\boxed{x=2n\pi+\pi \quad \text{OR} \quad x=n\pi+(-1)^n\frac{\pi}{6} \quad \text{G.S.}}$

$n=0 \quad x=\pi$ ✓ $\qquad$ $n=0\rightarrow x=\frac{\pi}{6}$ ✓

$n=1 \quad \cancel{x=2\pi+\pi\notin[0,2\pi]}$ $\qquad$ $n=1\rightarrow x=\pi-\frac{\pi}{6}$ ✓

$\cancel{n=2\ x=}$

Pr. Sol $=\{\frac{\pi}{6},\pi,\pi-\frac{\pi}{6}\}$

Nishant Jindal

Q 12

POR: $2e^{2\log K} - 1 = 7$

$\cancel{2}e^{\cancel{\log} K^2} = \cancel{8}4$

$K^2 = 4$

$K = 2, -2$

$x^2 - 6x + 7 = 0$

$36 - 28 > 0$ ✓

$K \cdots \overset{x}{2}$

x^2

15

$$\frac{x^2 - bx}{ax - c} = \frac{m-1}{m+1}$$

$(m+1)x^2 - b(m+1)x = a(m-1)x - c(m-1)$

$(m+1)x^2 - x(\underbrace{bm + b + am - a}) + c(m-1) = 0 \to \alpha, -\alpha$

Roots equal in mag but opp in sign

$SOR = \alpha + -\alpha = 0$

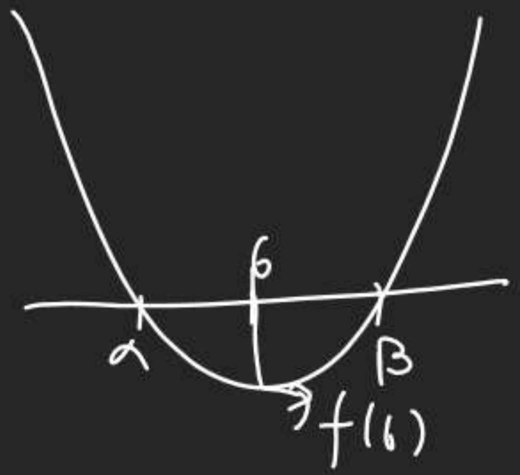
$-\frac{b}{a} = 1$ | $\frac{bm + am + b - a}{m+1} = 0$

$m(b+a) = \cancel{-(b+a)}\ a - b$

$m = \cancel{\frac{a+b}{a+b}}\ \frac{a-b}{a+b}$ ✓

Q20 LOR

all Psbl value of a, so that $\boxed{6}$ lies betⁿ Roots of $x^2+2(a-3)x+9=0$



1st Condⁿ

$f(6)<0$

$36+2(a-3)6+9<0$

$12a<-9$

$a<-\frac{\cancel{9}\,3}{\cancel{12}\,4}$

$a\in\left(-\infty,-\frac{3}{4}\right)$

Q8 $ax^2+bx+c=0 \Rightarrow ax^2+bx=-c$

$x(ax+b)=-c$

$ax+b=-\frac{c}{x}$

$a\alpha+b=-\frac{c}{\alpha}$ & $a\beta+b=-\frac{c}{\beta}$

Ex2 13

$(K-12)x^2+2(K-12)x+2=0$ No real Roots

$D<0$

$\cancel{4}(K-12)^2-\cancel{4}(K-12)(2)<0$

$(K-12)(K-12-2)<0$

$(K-12)(K-14)<0$

$12<K<14 \rightarrow K=13$

Nishant Jindal

Q 14

$a = 1 > 0$

QE > 0 $\quad a > 0, D < 0$

$x^2 - (K-3)x - K + 6 > 0$

$D < 0$ hona chahiy.

$(K-3)^2 - 4 \times 1 \times (-K+6) < 0$

$K^2 - 6K + 9 + 4K - 24 < 0$

$K^2 - 2K - 15 < 0$

$(K-5)(K+3) < 0$

$-3 < K < 5$