Ultimate KCET Crash Course 2026

Inverse trigonometric functions

MATHS

DPP: 2

Q1 If $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$, then what is the value of x ?

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

Q2 If $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x} = 4$ then x =

(A) tan2 (B) tan4
(C) tan(1/4) (D) tan8

Q3 $2\pi - \left(\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65}\right)$ equal to

(A) $\frac{\pi}{2}$ (B) $\frac{5\pi}{4}$
(C) $\frac{3\pi}{2}$ (D) $\frac{7\pi}{4}$

Q4 If x=1/5, then the value of cos($\cos^{-1}$x + 2$\sin^{-1}$x) is

(A) $\sqrt{-24/25}$ (B) $\sqrt{24/25}$
(C) -1/5 (D) 1/5

Q5 If $\alpha = \tan^{-1}\left(\frac{x\sqrt{3}}{2y-x}\right)$, $\beta = \tan^{-1}\left(\frac{2x-y}{y\sqrt{3}}\right)$ then $\alpha - \beta =$

(A) π/6 (B) π/3
(C) π/2 (D) -π/3

Q6 The value of cos ($\tan^{-1}$x) is

(A) $\frac{x}{\sqrt{1-x^2}}$ (B) $\frac{1}{\sqrt{1+x^2}}$
(C) $\sqrt{1-x^2}$ (D) $\frac{1}{\sqrt{1-x^2}}$

Q7 If $\sin^{-1}\frac{x}{5} + \text{cosec}^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then x =

(A) 3 (B) 4
(C) 5 (D) 1

Q8 If A = $\tan^{-1}$(1/7), B = $\tan^{-1}$(1/3), then

(A) cos2A = sin2A
(B) cos2A = sin2B
(C) cos2A = cos2B
(D) cos2A = sin4B

Q9 $\cos^{-1}\left[\cos\left(\left(-\frac{17}{15}\right)\pi\right)\right]$ is equal to

(A) $\frac{17\pi}{15}$ (B) $\frac{13\pi}{15}$
(C) $\frac{3\pi}{15}$ (D) $-\frac{17\pi}{15}$

Q10 If $\cot^{-1}\left[(\cos\alpha)^{\frac{1}{2}}\right] + \tan^{-1}\left[(\cos\alpha)^{\frac{1}{2}}\right] = x$, then sin x =

(A) 1
(B) $\cot^2(\alpha/2)$
(C) tanα
(D) cot(α/2)

Q11 $\text{cosec}^{-1}\left(\frac{3}{2}\right) + \cos^{-1}\left(\frac{2}{3}\right) - 2\cot^{-1}\left(\frac{1}{7}\right) - \cot^{-1}(7)$ is equal to

(A) $cot^{-1}7$ (B) $\tan^{-1}7$
(C) $\tan^{-1}\left(\frac{1}{7}\right)$ (D) $cot^{-1}\left(\frac{1}{7}\right)$

Q12 The number of positive integer solutions of $\tan^{-1}$x + $\tan^{-1}$y = $\tan^{-1}$ 3 is

(A) 0 (B) 1
(C) 2 (D) 3

Q13 $\sin\left\{\tan^{-1}\left(\frac{1-x^2}{2x}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$ is equal to

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

Q14 If $\sin\left(\sin^{-1}\left(\frac{1}{5}\right) + \cos^{-1}x\right) = 1$, $then\, x =$

(A) $\frac{-1}{5}$ (B) $\frac{1}{5}$
(C) -5 (D) 5

Q15 If $\cos^{-1}$ x = $\tan^{-1}$x, then sin($\cos^{-1}$ x) =

(A) x (B) x^2
(C) 1/x (D) 1/x2

Q16 The domain of the function $f(x) = \frac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$ is

(A) [1, 2] (B) [2, 3]
(C) [2, 3) (D) [1, 2)

Q17 If 0 ≤ x ≤ 1 and θ = $\sin^{-1}$x + $\cos^{-1}$x - $\tan^{-1}$x, then

(A) θ ≤ π/2
(B) θ ≥ π/4
(C) θ = π/4
(D) π/4 ≤ θ ≤ π/2

Q18 $\tan^{-1}\left(\cos\left(2\tan^{-1}\frac{3}{4}\right) + \sin\left(2\cot^{-1}\frac{1}{2}\right)\right)$

(A) not defined
(B) $\frac{\pi}{4}$
(C) > $\frac{\pi}{4}$
(D) < $\frac{\pi}{4}$

Q19 The value of sin (2 $\sin^{-1}$ 0.8) is equal to

(A) 0.48 (B) sin 1.2°
(C) sin 1.6° (D) 0.96

Q20 If $2\sin^{-1}x - 3\cos^{-1}x = 4$, then $2\sin^{-1}x + 3\cos^{-1}x$ is equal to

(A) $\frac{6\pi-4}{5}$ (B) $\frac{4-6\pi}{5}$
(C) $\frac{3\pi}{2}$ (D) 0

Q21 Solve for x : $\tan^{-1}\left(\frac{x-1}{x-2}\right)+\tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}$

(A) $\pm\frac{1}{\sqrt{3}}$ (B) $\pm\frac{1}{2}$

(C) $\pm\frac{1}{\sqrt{2}}$ (D) $\pm\frac{1}{\sqrt{6}}$

Q22 $\sin^{-1}\frac{\sqrt{x}}{\sqrt{x+a}}$ is equal to

(A) $\cos^{-1}\sqrt{\frac{x}{a}}$

(B) $\cos ec^{-1}\sqrt{\frac{x}{a}}$

(C) $\tan^{-1}\sqrt{\frac{x}{a}}$

(D) None of these

Q23 The number of positive integral solutions of $\tan^{-1}x+\cos^{-1}\frac{y}{\sqrt{1+y^2}}=\sin^{-1}\frac{3}{\sqrt{10}}$

(A) 0 (B) 1

(C) 2 (D) >2

Q24 $\sin\left(\cot^{-1}\left(\frac{2x}{1-x^2}\right)+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right)=$

(A) 1 (B) x

(C) $\frac{1}{x}$ (D) $\sqrt{1-x^2}$

Q25 If $\cos^{-1}x+\cos^{-1}y=2\pi$, then $\sin^{-1}x+\sin^{-1}y$ is equal to

(A) π

(B) $-\pi$

(C) $\frac{\pi}{2}-\frac{1}{2}\tan^{-1}x$

(D) 2π

Q26 If $x>0$, then the value of $\tan^{-1}x+\tan^{-1}\frac{1}{x}=$

(A) $\frac{\pi}{2}$ (B) π

(C) $\frac{-\pi}{2}$ (D) $-\pi$

Q27 If $\sin^{-1}\frac{3}{5}+\cos^{-1}\left(\frac{12}{13}\right)=\sin^{-1}C$, then C=

(A) $\frac{65}{56}$ (B) $\frac{24}{65}$

(C) $\frac{16}{65}$ (D) $\frac{56}{65}$

Q28 Given $0\le x\le\frac{1}{2}$ then the value of $\tan\left[\sin^{-1}\left\{\frac{x}{\sqrt{2}}+\frac{\sqrt{1-x^2}}{\sqrt{2}}\right\}-\sin^{-1}x\right]$ is

(A) 1 (B) $\sqrt{3}$

(C) –1 (D) $1/\sqrt{3}$

Q29 The smallest and the largest value of $\tan^{-1}\left(\frac{1-x}{1+x}\right), 0\le x\le 1$ are

(A) $0,\ \pi$

(B) $0,\ \frac{\pi}{4}$

(C) $-\frac{\pi}{4},\ \frac{\pi}{4}$

(D) $\frac{\pi}{4},\ \frac{\pi}{2}$

Q30 If $\sin^{-1}(\tan\pi/4)-\sin^{-1}\left(\sqrt{3/x}\right)-\pi/6=0$ then x is a root of the equation.

(A) $x^2-x-6=0$

(B) $x^2+x-6=0$

(C) $x^2-x-12=0$

(D) $x^2+x-12=0$

Answer Key

Q1	D
Q2	D
Q3	C
Q4	C
Q5	A
Q6	B
Q7	A
Q8	D
Q9	B
Q10	A
Q11	B
Q12	A
Q13	B
Q14	B
Q15	B
Q16	C
Q17	D
Q18	C
Q19	D
Q20	A
Q21	C
Q22	C
Q23	C
Q24	A
Q25	B
Q26	A
Q27	D
Q28	A
Q29	B
Q30	C

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

$\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$

$We\ know that,\ \sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$

On adding eq. (i) and (ii), we get

$2\sin^{-1}x = \frac{\pi}{6} + \frac{\pi}{2}$

$\Rightarrow \sin^{-1}x = \frac{\pi}{3} \Rightarrow x = \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

Video Solution:

Q2 Text Solution:

Taking x = tanθ, then

$$\tan^{-1}\frac{\sqrt{1+x^2}-1}{x} = \tan^{-1}\frac{\sec\theta-1}{\tan\theta}$$

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

Now, according to the given condition, $(1/2)\tan^{-1}x = 4$ □

$\tan^{-1}x = 8$ or $x = \tan 8$

Q3 Text Solution:

$We\ have\ 2\pi$

$-\left(\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65}\right)$

$= 2\pi$

$-\left(\sin^{-1}\left(\frac{4}{5}\sqrt{1-\frac{25}{169}} + \frac{5}{13}\sqrt{1-\frac{16}{25}}\right) + \sin^{-1}\frac{16}{65}\right)$

$= 2\pi - \left(\sin^{-1}\frac{63}{65} + \sin^{-1}\frac{16}{65}\right)$

$= 2\pi$

$-\sin^{-1}\left(\frac{63}{65}\sqrt{1-\frac{256}{4225}} + \frac{16}{65}\sqrt{1-\frac{3969}{4225}}\right)$

$= 2\pi - \sin^{-1}\left(\frac{63}{65}\times\frac{63}{65} + \frac{16}{65}\times\frac{16}{65}\right)$

$= 2\pi - \sin^{-1}(1) = 2\pi - \frac{\pi}{2} = \frac{3\pi}{2}$

Video Solution:

Q4 Text Solution:

The given expression is equal to

$\cos(\cos^{-1}x + \sin^{-1}x + \sin^{-1}x) = \cos(\pi/2 + \sin^{-1}x)$

$= -\sin(\sin^{-1}x) = -x = -1/5$

Video Solution:

Q5 Text Solution:

$$\text{Given } \alpha = \tan^{-1}\frac{x\sqrt{3}}{2y-x} \text{ and } \beta = \tan^{-1}\left(\frac{2x-y}{y\sqrt{3}}\right)$$

$$\text{Let } x = 1,\ y = 1$$

$$\alpha = \tan\left(\sqrt{3}\right) = \frac{\pi}{3} \quad \text{and} \quad \beta = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right) = \frac{\pi}{6}$$

$$\alpha - \beta = \frac{\pi}{3} - \frac{\pi}{6} = \frac{\pi}{6}$$

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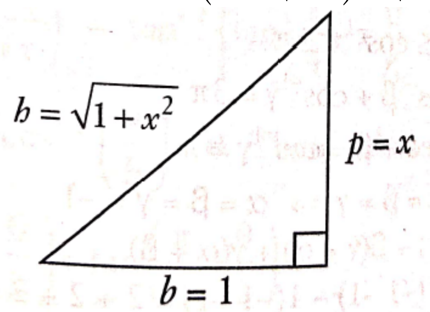
Video Solution:

Q6 Text Solution:

Given,

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



Video Solution:

Q7 Text Solution:

$$\sin^{-1}\frac{x}{5}+\operatorname{cosec}^{-1}\left(\frac{5}{4}\right)=\frac{\pi}{2}$$

$$\Rightarrow \sin^{-1}\frac{x}{5}=\frac{\pi}{2}-\sin^{-1}\frac{4}{5}=\frac{\pi}{2}-\cos^{-1}\frac{3}{5}$$

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

$$\Rightarrow x=3$$

Video Solution:

Q8 Text Solution:

We have, tan A = 1/7, tan B = 1/3

$$\cos 2A=\frac{1-\tan^2 A}{1+\tan^2 A}=\frac{1-1/49}{1+1/49}=\frac{48}{50}=\frac{24}{25}$$

$$\sin 2A=\frac{2\tan A}{1+\tan^2 A}=\frac{2\times 1/7}{1+1/49}=\frac{7}{25}$$

$$\cos 2B=\frac{1-1/9}{1+1/9}=\frac{4}{5}\ and\ \sin 2B=\frac{2\times 1/3}{1+1/9}$$

$$=\frac{3}{5}$$

$$so\ that\ \cos 2A=\sin 4B$$

Video Solution:

Q9 Text Solution:

$$\cos^{-1}\left(\cos\left(-\frac{17\pi}{15}\right)\right)=\cos^{-1}\left(\cos\left(\frac{17\pi}{15}\right)\right)$$

$$=\cos^{-1}\left[\cos\left(2\pi-\frac{13\pi}{15}\right)\right]=\cos^{-1}\left[\cos\frac{13\pi}{15}\right]$$

$$=\frac{13\pi}{15}$$

Video Solution:

Q10 Text Solution:

Using $\tan^{-1}\theta+\cot^{-1}\theta=\pi/2=x$

$\therefore\ \sin x=\sin\pi/2=1$

Video Solution:

Q11 Text Solution:

$$\sin^{-1}\left(\frac{2}{3}\right)+\cos^{-1}\left(\frac{2}{3}\right)-\tan^{-1}7-\cot^{-1}7$$

$$-\cot^{-1}\left(\frac{1}{7}\right)=\frac{\pi}{2}-\frac{\pi}{2}-\cot^{-1}\left(\frac{1}{7}\right)=-\tan^{-1}7$$

$$\Rightarrow \sin^{-1}\frac{x}{5}+\sin^{-1}\frac{4}{5}=\frac{\pi}{2}$$

Video Solution:

Q12 Text Solution:

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

$$\Rightarrow \frac{x+y}{1-xy}=3 \Rightarrow x+y=3-3xy$$

$$\Rightarrow\ y=\frac{3-x}{1+3x}, x, y\ are\ positive\ \Rightarrow x<3$$

$$\Rightarrow\ x=1, y=\frac{1}{2}; x=2, y=\frac{1}{7}$$

There are no integer pairs (x,y).

Video Solution:

Q13 Text Solution:

$$\sin\left[\tan^{-1}\left(\frac{1-x^2}{2x}\right)+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right]$$

Putting x = tan q we get,

$$\sin\left[\tan^{-1}\left(\frac{1-\tan^2\theta}{2\tan\theta}\right)+\cos^{-1}\left(\frac{1-\tan^2\theta}{1+\tan^2\theta}\right)\right]$$

$$=\sin\left[\tan^{-1}(\cot 2\theta)+\cos^{-1}(\cos 2\theta)\right]$$

$$=\sin\left[\tan^{-1}\tan(\pi/2-2\theta)+\cos^{-1}\cos 2\theta\right]$$

$$=1$$

Video Solution:

Q14 Text Solution:

We have

$$\sin\left(\frac{\pi}{2}\right)=1,\ then$$

$$\sin^{-1}\left(\frac{1}{5}\right)+\cos^{-1}x=\frac{\pi}{2}$$

$$Let\ \sin^{-1}\frac{1}{5}=\theta \Rightarrow \sin\theta=\frac{1}{5}$$

$$Then\ \cos^{-1}x=\frac{\pi}{2}-\theta \Rightarrow x=\cos\theta\left(\frac{\pi}{2}-\theta\right)$$

$$=\sin\theta \Rightarrow x=\frac{1}{5}$$

Video Solution:

Q15 Text Solution:

$\cos^{-1}x = \tan^{-1}x = \theta \ (says) \ \Rightarrow x = \cos\theta$

$= \tan\theta$

$\Rightarrow \cos^2\theta = \sin\theta$

$\Rightarrow \sin^2\theta + \sin\theta - 1 = 0$

$\Rightarrow \sin\theta = \frac{-1\pm\sqrt{1+4}}{2} \Rightarrow \sin\theta = \frac{\sqrt{5}-1}{2}$

$and \ \sin\left(\cos^{-1}x\right) = \sin\theta = \frac{\sqrt{5}-1}{2} = x^2$

Video Solution:

Q16 Text Solution:

Let $f_1(x) = \sin^{-1}(x-3), \quad f_2(x) = \sqrt{9-x^2}$

$d_{f_1} \ \Rightarrow \ -1 \le x-3 \le 1$

$2 \le x \le 4$

$\therefore d_{f_1} = x \in [2, 4]$

$d_{f_2} \ \Rightarrow 9 - x^2 > 0 \ \Rightarrow x^2 < 0 \ \text{or} \ |x| < 3$

$d_{f_2} = x \in (-3, 3)$

$\therefore \ d_f = d_{f_1} \cap d_{f_2} = [2, 3)$

Video Solution:

Q17 Text Solution:

$\theta = \sin^{-1}x + \cos^{-1}x - \tan^{-1}x = \pi/2$

$- \tan^{-1}x$

$\Rightarrow \theta = \cot^{-1}x \Rightarrow \cot\theta = x$

$As \ 0 \le x \le 1 \Rightarrow \frac{\pi}{4} \le \theta \le \frac{\pi}{2}$

Video Solution:

Q18 Text Solution:

$\cos\left(2\tan^{-1}\frac{3}{4}\right) = \frac{1-\frac{9}{16}}{1+\frac{9}{16}} = \frac{7}{25}$

$\sin\left(2\cot^{-1}\frac{1}{2}\right) = \sin\left(2\tan^{-1}2\right) = \frac{2\times2}{1+4} = \frac{4}{5}$

$\left(\text{Since } \cos2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}, \sin2\theta = \frac{2\tan\theta}{1+\tan^2\theta}\right)$

The given expression becomes

$\tan^{-1}\left(\frac{7}{25} + \frac{4}{5}\right) = \tan^{-1}\frac{27}{25} > \tan^{-1}1 = \frac{\pi}{4}.$

Video Solution:

Q19 Text Solution:

sin {2 $\sin^{-1}$ (0.8)}

By ITF identity

WKT: $2\sin^{-1}x = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$

$\therefore \sin\left\{\sin^{-1}(2(0.8))\sqrt{1-(0.8)^2}\right\}$

sin {$\sin^{-1}$ (1.6 × 0.6)}

sin {$\sin^{-1}$ (0.96)} = 0.96

Video Solution:

Q20 Text Solution:

Given $2\sin^{-1}x - 3\cos^{-1}x = 4$ ...(i)

WKT

$\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$

$3\sin^{-1}x + 3\cos^{-1}x = \frac{3\pi}{2}$ ...(ii)

$(i)+(ii)$

$5\sin^{-1}x = 4 + \frac{3\pi}{2}$

$\sin^{-1}x = \frac{4}{5} + \frac{3\pi}{10}$

$(i)\Rightarrow$

$\frac{8}{5} + \frac{3\pi}{5} - 3\cos^{-1}x = 4$

$\frac{-12}{5} + \frac{3\pi}{5} = 3\cos^{-1}x$

$\cos^{-1}x = \frac{-4}{5} + \frac{\pi}{5}$

$\therefore 2\sin^{-1}x + 3\cos^{-1}x$

$= \frac{8}{5} + \frac{3\pi}{5} - \frac{12}{5} + \frac{3\pi}{5} = \frac{-4+6\pi}{5}$

$= \frac{6\pi-4}{5}$

Video Solution:

Q21 Text Solution:

Given quation is

$\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$

$\Rightarrow \ \tan^{-1}\left\{\frac{\frac{x-1}{x-2}+\frac{x+1}{x+2}}{1-\frac{x-1}{x-2}+\frac{x+1}{x+2}}\right\} = \frac{\pi}{4}$

$\Rightarrow \ \frac{(x-1)(x+2)+(x+1)(x-2)}{(x-2)(x+2)-(x-1)(x+1)} = \tan\left(\frac{\pi}{4}\right)$

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

$\Rightarrow \ 2x^2 - 4 = -3 \Rightarrow 2x^2 = 1 \Rightarrow x^2 = \frac{1}{2}$

$\Rightarrow x = \pm\frac{1}{\sqrt{2}}$

Video Solution:

Q22 **Text Solution:**

Putting x = a $\tan^2$ q

$$\sin^{-1}\frac{\sqrt{x}}{\sqrt{x+a}} = \sin^{-1}\frac{\sqrt{a}\sqrt{\tan^2\theta}}{\sqrt{a\tan^2\theta+a}}$$

$$= \sin^{-1}\frac{\sqrt{a}\tan\theta}{\sqrt{a}\sec\theta}$$

$$= \sin^{-1}\sin\theta = \theta = \tan^{-1}\left(\sqrt{\frac{x}{a}}\right)$$

Video Solution:

Q23 **Text Solution:**

$$\tan^{-1}x + \cos^{-1}\frac{y}{\sqrt{1+y^2}} = \sin^{-1}\frac{3}{\sqrt{10}}$$

$$\tan^{-1}x + \tan^{-1}\frac{1}{y} = \tan^{-1}3 \Rightarrow \frac{x+\frac{1}{y}}{1-\frac{x}{y}} = 3$$

$$\Rightarrow xy + 1 = 3(y - x)$$

$$\Rightarrow y = \frac{1+3x}{3-x} \Rightarrow x < 3 \Rightarrow x = 1, y = 2, x = 2, y = 7$$

Video Solution:

Q24 **Text Solution:**

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

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

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

$$\therefore\ \textit{The given expression} = \sin\frac{\pi}{2} = 1$$

Video Solution:

Q25 **Text Solution:**

$$\cos^{-1}x + \cos^{-1}y = 2\pi$$

$$\Rightarrow \frac{\pi}{2} - \sin^{-1}x + \frac{\pi}{2} - \sin^{-1}y = 2\pi$$

$$\Rightarrow \pi - \left(\sin^{-1}x + \sin^{-1}y\right) = 2\pi$$

$$\Rightarrow \sin^{-1}x + \sin^{-1}y = -\pi$$

Video Solution:

Q26 **Text Solution:**

$$\tan^{-1}\frac{1}{x} = \begin{cases} \cot^{-1}x & \text{when } x > 0 \\ -\pi + \cot^{-1}x & \text{when } x < 0 \end{cases}$$

$$\tan^{-1}x + \tan^{-1}\frac{1}{x} = \tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}$$

Video Solution:

Q27 **Text Solution:**

Givne $\sin^{-1}C = \sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13}$

$$\Rightarrow C = \sin\left(\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13}\right)$$

using, $\sin(A + B) = \sin A\cos B + \cos A\sin B$

$$\Rightarrow C = \frac{3}{5} \times \frac{12}{13} + \sqrt{1 - \frac{9}{25}}\sqrt{1 - \frac{144}{169}} \Rightarrow C = \frac{56}{65}$$

Video Solution:

Q28 **Text Solution:**

Using a suitable substitution for *x* to obtain the desired result. Refer video solution.

Video Solution:

Q29 Text Solution:

We have,

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

$-\tan^{-1}x$

Since $0\leq x\leq 1\ \Rightarrow 0\leq\tan^{-1}x\leq\frac{\pi}{4}$

$\Rightarrow\ 0\geq-\tan^{-1}x\geq\frac{-\pi}{4}\ \Rightarrow\frac{\pi}{4}\geq\frac{\pi}{4}$

$-\tan^{-1}x\geq 0$

$\Rightarrow\ \frac{\pi}{4}\geq\tan^{-1}\left(\frac{1-x}{1+x}\right)\geq 0$

Video Solution:

Q30 Text Solution:

$\text{G.T. }\sin^{-1}\left[\tan\frac{\pi}{4}\right]-\sin^{-1}\left[\sqrt{3/x}\right]=\frac{\pi}{6}$

$\sin^{-1}(1)-\sin^{-1}\frac{\sqrt{3}}{\sqrt{x}}=\frac{\pi}{6}$

$\frac{\pi}{2}-\frac{\pi}{6}=\sin^{-1}\frac{\sqrt{3}}{\sqrt{x}}$

$\sin\left(\frac{\pi}{3}\right)=\frac{\sqrt{3}}{2}=\frac{\sqrt{3}}{\sqrt{x}}$

$\Rightarrow\ \sqrt{x}=2$

$\Rightarrow\ x=4$

That is the root of the equation $x^2+x-12=0$

Video Solution: