Vernacular

Ultimate kcet crash course 2026

Maths

Inverse trigonometric functions

DPP: 1

Q1 Sec(cosec^{-1}x) is equal to

(A) Cosec(sec^{-1}x) (B) cot x
(C) π (D) None of these

Q2 $\sin\left[\frac{\pi}{2}-\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]=$

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

Q3 If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=3$, then $xy+yz+zx$ is

(A) 1 (B) 0
(C) –3 (D) 3

Q4 If $\tan(x+y)=33$ and $x=\tan^{-1}3$, then y is

(A) 3/10
(B) 33/10
(C) $\tan^{-1}(1/3)$
(D) $\tan^{-1}(3/10)$

Q5 If $x\in[0,\ 1]$, then $\frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right)=$

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

Q6 the value of $\sin\left(\cot^{-1}\left(\cot\frac{17\pi}{3}\right)\right)$

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

Q7 The value of $\sin^{-1}\left(\cos\left(\frac{43\pi}{5}\right)\right)$ is

(A) 3π/5 (B) –7π/5
(C) π/10 (D) –π/10

Q8 If $\tan^{-1}a^3+\tan^{-1}a=\tan^{-1}b$, then $b=$

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

Q9 The principal value of $\cos^{-1}\left\{\sin\left(\cos^{-1}\frac{1}{2}\right)\right\}$

(A) π/6 (B) π/3
(C) π/4 (D) 2π/3

Q10 If $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right)=1$, then the value of x is.

(A) -1 (B) 2/5
(C) 1/3 (D) 1/5

Q11 The value of $\sin\left[2\cos^{-1}\left(\frac{3}{5}\right)\right]$

(A) 24/25 (B) 2√6/5
(C) 2√5/6 (D) 16/25

Q12 The value of sin (cot^{-1}x) is

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

Q13 $\cos\left[\sin^{-1}\frac{1}{4}+\sec^{-1}\frac{4}{3}\right]$

(A) $\frac{3\sqrt{15}+\sqrt{7}}{4}$ (B) $\frac{3\sqrt{15}-\sqrt{7}}{16}$
(C) $\frac{\sqrt{7}-3\sqrt{5}}{16}$ (D) $\frac{3\sqrt{15}-\sqrt{7}}{4}$

Q14 If $\sin^{-1}(\sin x)=-\pi-x$ then x belongs to

(A) $\left[\frac{3\pi}{2},\frac{5\pi}{2}\right]$
(B) $\left[-\frac{3\pi}{2},-\frac{\pi}{2}\right]$
(C) $\left[-\frac{5\pi}{2},-\frac{3\pi}{2}\right]$
(D) $[0,\pi]$

Q15 The value of $\sin\left[2\cos^{-1}\left(\frac{3}{5}\right)\right]$

(A) 24/25 (B) 2√6/5
(C) 2√5/6 (D) 16/25

Q16 The principal value of the expression $\cos^{-1}[\cos(-680°)]$ is

(A) 2π/9 (B) –2π/9
(C) 34π/9 (D) π/9

Q17 $\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)$ is equal to

(A) $2\sin^{-1}\left(\frac{x}{a}\right)$ (B) $\sin^{-1}\left(\frac{2x}{a}\right)$
(C) $\sin^{-1}\left(\frac{x}{a}\right)$ (D) $\cos^{-1}\left(\frac{x}{a}\right)$

Q18 If $\cot^{-1}\frac{n}{\pi} > \frac{\pi}{6}$, $n \in Z$ then the maximum value of n is

(A) 1 (B) 5
(C) 9 (D) 3

Q19 Domain of $\sin^{-1}[x]$ (where [.] denotes G.I.F.) is

(A) [–1, 2] (B) [–1, 2)
(C) (–1, 2] (D) None of these

Q20 The domain of the function $(x)= \sin^{-1}\left(\frac{x+5}{2}\right)$

(A) [-1,1] (B) [2,3]
(C) [3,7] (D) [-7,-3]

Q21 $\tan\left(3\tan^{-1}\left(\frac{1}{5}\right)-\frac{\pi}{4}\right)=$

(A) –13/46 (B) –13/46
(C) –9/46 (D) –4/23

Q22 The number of real solutions of the equation $\sqrt{1+\cos 2x} = \sqrt{2}\cos^{-1}(\cos x)\, in \left[\frac{\pi}{2}, \pi\right]$

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

Q23 Find the principal value of $\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)$ equal to.

(A) p/4 (B) p/6
(C) p/3 (D) 2p/3

Q24 $\sin\left\{\tan^{-1}\left(\frac{1-x^2}{2x}\right)+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$ is equal to

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

Q25 The value of $\cot\left[\cos^{-1}\left(\frac{7}{25}\right)\right]$ is

(A) $\frac{25}{24}$ (B) $\frac{25}{7}$
(C) $\frac{24}{25}$ (D) $\frac{7}{24}$

Q26 The value of $\cot^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right]$, $Where\, x \in \left(0, \frac{\pi}{4}\right)\, is$

(A) $\pi - \frac{x}{3}$
(B) $\frac{x}{2}$
(C) $\pi - \frac{x}{2}$
(D) $\frac{x}{2} - \pi$

Q27 $If\ x < \pi, \tan^{-1}\left(\frac{\cos x-\sin x}{\cos x+\sin x}\right)=$

(A) $\frac{\pi}{2} - x$
(B) $\frac{\pi}{4} - x$
(C) $\frac{\pi}{3} - x$
(D) none of these

Q28 Find the value of $\cos\left(\sin^{-1}\frac{8}{17}\right)$

(A) $\frac{8}{17}$ (B) $\frac{9}{17}$
(C) $\frac{15}{17}$ (D) $\frac{17}{15}$

Q29 The value of $\sin^{-1}\left[\cos\left(\frac{33\pi}{5}\right)\right]$

(A) $\frac{3\pi}{5}$ (B) $\frac{-7\pi}{5}$
(C) $\frac{\pi}{10}$ (D) $\frac{-\pi}{5}$

Q30 The value of $\tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right], |x| < \frac{1}{2}, x \neq 0$, is equal to

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

Answer Key

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

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

we know that sec(cosec-1x) = Cosec(sec^{-1}x)

$= \frac{|x|}{\sqrt{x^2 - 1}},\ for\ |x| > 1$

Video Solution:

Q2 Text Solution:

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

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

$\Rightarrow \sin\left(\frac{\pi}{2} - \left[-\frac{\pi}{3}\right)\right] = \sin\left[\frac{\pi}{2} + \frac{\pi}{3}\right] = \cos\frac{\pi}{3}$

$= \frac{1}{2}$

Video Solution:

Q3 Text Solution:

Principal range of $\cos^{-1} x$ is $[0, \pi]$

$i.e.,\ 0 \leq \cos^{-1} x \leq \pi$

Clearly maximum value of $\cos^{-1} x = \pi$

$\therefore x = \cos(\pi) = -1$

Similarly $y = -1,\ z = -1$

$\therefore\ xy + yz + zx = 3$

Video Solution:

Q4 Text Solution:

Given $\tan(x + y) = 33,\quad x = \tan^{-1} 3$

$\Rightarrow \tan x = 3$

$\frac{\tan x + \tan y}{1 - \tan x \cdot \tan y} = 33$

$\frac{3 + \tan y}{1 - 3 \cdot \tan y} = 33 \quad \Rightarrow 3 + \tan y = 33 - 99 \tan y$

$100 \tan y = 30$

$\tan y = \frac{3}{10}$ or $y = \tan^{-1}\left(\frac{3}{10}\right)$

Video Solution:

Q5 Text Solution:

Let $x = \tan^2\theta \Rightarrow \tan\theta = \sqrt{x} \Rightarrow \theta$

$= \tan^{-1} x$

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

$= \tan^{-1}\sqrt{x}$

Video Solution:

Q6 **Text Solution:**

We have, $\sin\left(\cot^{-1}\left(\cot\left(\frac{17\pi}{3}\right)\right)\right)$

$$= \sin\left(\cot^{-1}\left(\cot\left(6\pi - \frac{\pi}{3}\right)\right)\right)$$

$$= \sin\left(\cot^{-1}\left(-\cot\frac{\pi}{3}\right)\right)$$

$$= \sin\left(\pi - \cot^{-1}\left(\cot\frac{\pi}{3}\right)\right) = \sin\left(\pi - \frac{\pi}{3}\right)$$

$$= \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

Video Solution:

Q7 **Text Solution:**

$$\sin^{-1}\left(\cos\left(8\pi + \frac{3\pi}{5}\right)\right) = \sin^{-1}\left(\cos\left(\frac{3\pi}{5}\right)\right)$$

$$= \sin^{-1}\left(\sin\left(\frac{\pi}{2} - \frac{3\pi}{5}\right)\right)$$

$$= \sin^{-1}\left(\sin\left(\frac{-\pi}{10}\right)\right) = \frac{-\pi}{10}$$

Video Solution:

Q8 **Text Solution:**

$$\tan^{-1} a^3 + \tan^{-1} a = \tan^{-1} b$$

$$\Rightarrow \tan^{-1}\frac{a^3+a}{1-a^4} = \tan^{-1} b$$

$$\Rightarrow b = \frac{a\left(1+a^2\right)}{\left(1-a^2\right)\left(1+a^2\right)} = \frac{a}{1-a^2}$$

Video Solution:

Q9 **Text Solution:**

We have, $\cos^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{3}$

$$\therefore \cos^{-1}\left\{\sin\left(\cos^{-1}\frac{1}{2}\right)\right\} = \cos^{-1}\left\{\sin\left(\frac{\pi}{3}\right)\right\}$$

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

Video Solution:

Q10 **Text Solution:**

We have, $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$

$$\Rightarrow \sin^{-1}\frac{1}{5} + \cos^{-1} x = \sin^{-1}(1)$$

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

$$\Rightarrow \sin^{-1}\frac{1}{5} - \sin^{-1} x = 0 \Rightarrow \sin^{-1}\frac{1}{5} = \sin^{-1} x$$

$$\Rightarrow x = \sin\left(\sin^{-1}\frac{1}{5}\right) \Rightarrow x = \frac{1}{5}$$

Video Solution:

Q11 **Text Solution:**

$$\sin\left[2\cos^{-1}\left(\frac{3}{5}\right)\right]$$

let $\cos^{-1}\left(\frac{3}{5}\right) = \theta \Rightarrow \cos\theta = \frac{3}{5}$ and $\sin\theta = \frac{4}{5}$

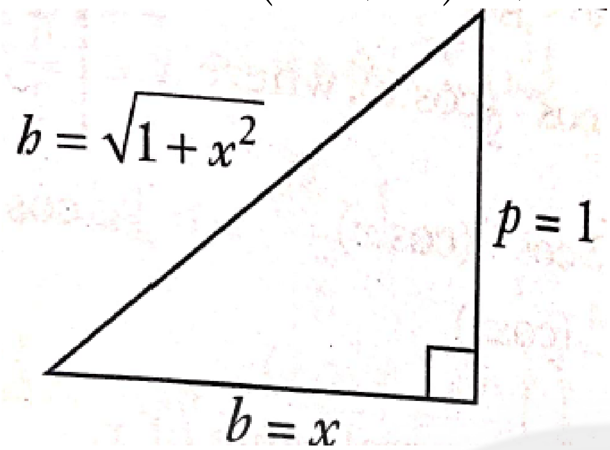
$$\therefore \sin(2\theta) = 2\sin\theta\cos\theta = 2\cdot\frac{3}{5}\cdot\frac{4}{5} = \frac{24}{25}$$

Video Solution:

Q12 Text Solution:

Given,

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



Video Solution:

Q13 Text Solution:

$\cos\left\{\sin^{-1}\frac{1}{4}+\sec^{-1}\frac{4}{3}\right\}$ ...(i)

Let $\sin^{-1}\frac{1}{4}=A$ and $\sec^{-1}\frac{4}{3}=B$

$\therefore\ \sin A=\frac{1}{4};\quad \cos A=\frac{\sqrt{15}}{4}$

$\sec B=\frac{4}{3}\ \Rightarrow \cos B=\frac{3}{4};\ \sin B=\frac{\sqrt{7}}{4}$

$(i)\ \Rightarrow\ \cos(A+B)=\cos A\cos B-\sin A\cdot\sin B$

$$=\frac{\sqrt{15}}{4}\cdot\frac{3}{4}-\frac{1}{4}\cdot\frac{\sqrt{7}}{4}$$

$$=\frac{3\sqrt{15}-\sqrt{7}}{16}$$

Video Solution:

Q14 Text Solution:

$-\frac{\pi}{2}\le x\le\frac{\pi}{2}\Rightarrow-\frac{\pi}{2}\le -x\le\frac{\pi}{2}$

$\Rightarrow -\pi-\frac{\pi}{2}\le-\pi-x\le-\pi+\frac{\pi}{2}\Rightarrow-\frac{3\pi}{2}\le -\pi-x \le-\frac{\pi}{2}$

Video Solution:

Q15 Text Solution:

$\sin\left[2\cos^{-1}\left(\frac{3}{5}\right)\right]$

let $\cos^{-1}\left(\frac{3}{5}\right)=\theta\ \Rightarrow\cos\theta=\frac{3}{5}$ and $\sin\theta=\frac{4}{5}$

$\therefore\ \sin(2\theta)=2\sin\theta\cos\theta=2\cdot\frac{3}{5}\cdot\frac{4}{5}=\frac{24}{25}$

Video Solution:

Q16 Text Solution:

$\cos^{-1}(\cos(-680^\circ))=\cos^{-1}(\cos(680^\circ))$

$=\cos^{-1}(\cos(720^\circ-40^\circ))$

$=\cos^{-1}(\cos(40^\circ))=40^\circ=\frac{2\pi}{9}$

Video Solution:

Q17 Text Solution:

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

put $y=\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right)$

$\tan y=\frac{x}{\sqrt{a^2-x^2}}$

$\therefore y=\sin^{-1}\left(\frac{x}{a}\right)$

Video Solution:

Q18 Text Solution:

Given : $\cot^{-1}\left(\frac{n}{\pi}\right)>\frac{\pi}{6}$

Since cot *x* is decreasing function

$\cot\left(\cot^{-1}\left(\frac{n}{\pi}\right)\right)<\cot\left(\frac{\pi}{6}\right)$

$\frac{n}{\pi}<\sqrt{3}$ or $n<\sqrt{3}\pi$

$\therefore\ n<5.44$

Since $n\in IN \ \Rightarrow n=5$

Video Solution:

Q19 Text Solution:

Let $f(x)=\sin^{-1}[x]$

if $[x]=\theta;$ then $-1\le\theta\le1$

$\therefore -1\le[x]\le 1$

$\Rightarrow\ x\in[-1,\ 0)\cup[0,\ 1)\cup[1,\ 2)$

$\therefore x\in[-1,\ 2)$

Video Solution:

Q20 Text Solution:

$f(x)=\sin^{-1}\left(\frac{x+5}{2}\right)\Rightarrow -1\le\frac{x+5}{2}\le1\ \Rightarrow -2$

$-5\le x\le 2-5\Rightarrow -7\le x\le -3z$

$D(f(x))=[-7,-3]$

Video Solution:

Q21 Text Solution:

$\tan\left\{3\tan^{-1}\left(\frac{1}{5}\right)-\frac{\pi}{4}\right\}$

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

$=\tan\left\{\tan^{-1}\left(\frac{2}{5}\times\frac{25}{24}\right)+\tan^{-1}\left(-\frac{4}{5}\times\frac{5}{6}\right)\right\}$

$=\tan\left\{\tan^{-1}\left(\frac{5}{12}\right)-\tan^{-1}\left(\frac{2}{3}\right)\right\}$

$=\tan\left(\tan^{-1}\frac{\frac{5}{12}-\frac{2}{3}}{1+\frac{5}{18}}\right)$

$=\tan\left\{\tan^{-1}\left(\frac{-3}{12}\times\frac{18}{23}\right)\right\}$

$=-\frac{9}{46}$

Video Solution:

Q22 Text Solution:

$\sqrt{1+\cos 2x}=\sqrt{2}\cos^{-1}(\cos x)$

$\Rightarrow\ \sqrt{2}|\cos x|=\sqrt{2}\cos^{-1}(\cos x)\Rightarrow|\cos x|$
$=x$

No solution.

Video Solution:

Q23 Text Solution:

Let $\cos^{-1}\left(\frac{1}{2}\right)=\theta\ \Rightarrow\cos\theta=\frac{1}{2}=\cos\frac{\pi}{3}$

$\Rightarrow\ \theta=\frac{\pi}{3}\in[0,\ \pi]$

\ Principal value of $\cos^{-1}\frac{1}{2}$ is $\frac{\pi}{3}$.

Let $\sin^{-1}\left(\frac{1}{2}\right)=\phi$

$\Rightarrow\sin\phi=\frac{1}{2}=\sin\frac{\pi}{6}$

$\Rightarrow\ \phi=\frac{\pi}{6}\in\left[\frac{-\pi}{2},\ \frac{\pi}{2}\right]$

So, the value of

$\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)=\frac{\pi}{3}+2\times\frac{\pi}{6}$

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

Video Solution:

Q24 Text Solution:

Putting $x=\tan\theta$ *we get,*

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

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

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

$=\sin\frac{\pi}{2}=1$

Video Solution:

Q25 Text Solution:

Consider $\cos^{-1}\frac{7}{25}=\alpha$

$\Rightarrow\cos\alpha=\frac{7}{25}$

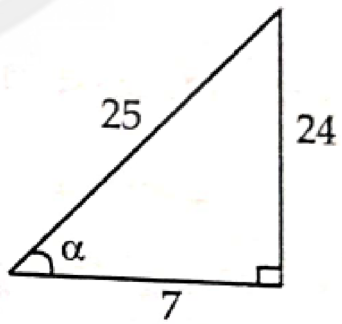
$\therefore\ \sin\alpha=\sqrt{1-\cos^2\alpha}=\sqrt{1-\left(\frac{7}{25}\right)^2}$

$=\sqrt{\frac{625-49}{625}}=\frac{24}{25}$

$\therefore\cot\alpha=\frac{7}{24}\Rightarrow\alpha=\cot^{-1}\left(\frac{7}{24}\right)$

Hence, $\therefore\cot\left(\cos^{-1}\frac{7}{25}\right)=\cot\left(\cot^{-1}\frac{7}{24}\right)$
$=\frac{7}{24}$

$[From\ (i)\ and\ (ii)]$



Video Solution:

Q26 Text Solution:

We have,

$\cot^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right], x \in\left(0, \frac{\pi}{4}\right)$

$=\cot^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}} \times \frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}+\sqrt{1+\sin x}}\right]$

$=\cot^{-1}\left[\frac{1-\sin x+1+\sin x+2\sqrt{1-\sin^2 x}}{1-\sin x-1-\sin x}\right]$

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

$\left[\because 1+\cos x=2\cos^2 x/2, \sin x=2\sin x/2\cos x/2\right]$

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

$\left[\because \cot^{-1}(\cot x)=x, x \in(0, \pi)\right]$

Video Solution:

Q27 Text Solution:

We have, $\tan^{-1}\left(\frac{\cos x-\sin x}{\cos x+\sin x}\right)$

Dividing numerator and denominator by , we get

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

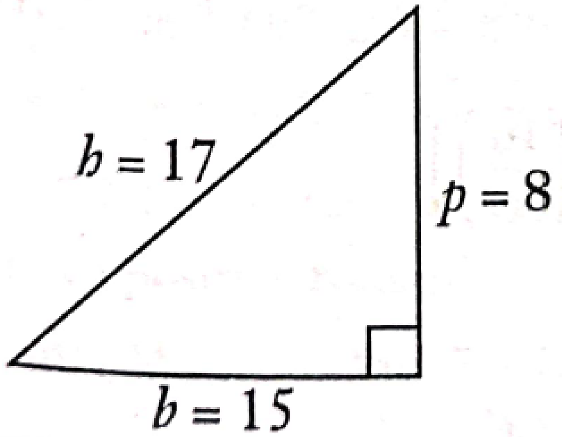
$=\left(\frac{\pi}{4}-x\right)$

Video Solution:

Q28 Text Solution:

$\cos\left(\sin^{-1}\frac{8}{17}\right)=\cos\left(\cos^{-1}\frac{15}{17}\right)=\frac{15}{17}$

$\left[\because \sin^{-1}\frac{8}{17}=\cos^{-1}\frac{15}{17}\right]$



Video Solution:

Q29 Text Solution:

since $\sin^{-1}\left(\cos\frac{33\pi}{5}\right)$

$=\sin^{-1}\left[\cos\left(6\pi+\frac{3\pi}{5}\right)\right]$

$=\sin^{-1}\left[\cos\left(\frac{3\pi}{5}\right)\right]$ $[\because \cos(2n\pi+\theta)=\cos\theta]$

$=\sin^{-1}\left[\cos\left(\frac{\pi}{2}+\frac{\pi}{10}\right)\right]=\sin^{-1}\left(-\sin\frac{\pi}{10}\right)=-\sin^{-1}\left(\sin\frac{\pi}{10}\right)$

$=-\frac{\pi}{10}\left[\because \sin^{-1}(\sin x)=x, x \in\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)\right]$

Video Solution:

Q30 Text Solution:

$\tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]$

Put $x^2=\cos 2\theta$

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

$$= \tan^{-1}\left[\frac{\sqrt{1+\cos 2\theta}+\sqrt{1-\cos 2\theta}}{\sqrt{1+\cos 2\theta}-\sqrt{1-\cos 2\theta}}\right]$$

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

$$= \tan^{-1}\left[\frac{1+\tan\theta}{1-\tan\theta}\right]= \frac{\pi}{4}+\theta=\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x^2$$

Video Solution: