PARISHRAM 2026

Mathematics

Inverse Trigonometric Functions

DPP: 5

Q1 $\tan\left(2\tan^{-1}\frac{1}{5}\right)=$

(A) $\frac{24}{5}$
(B) $\frac{5}{24}$
(C) $\frac{12}{5}$
(D) $\frac{5}{12}$

Q2 $2\sin^{-1}\frac{3}{5}-\tan^{-1}\frac{17}{31}=$

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

Q3 The value of $\sin\left(2\tan^{-1}\frac{12}{5}\right)$ is equal to

(A) $\frac{110}{169}$
(B) $\frac{120}{169}$
(C) $\frac{121}{169}$
(D) $\frac{12}{5}$

Q4 The value of $\cos\left(2\sin^{-1}\frac{3}{5}\right)$ is equal to

(A) $\frac{7}{25}$
(B) $\frac{9}{25}$
(C) $\frac{16}{25}$
(D) 1

Q5 $\tan\left\{2\tan^{-1}\frac{1}{5}-\frac{\pi}{4}\right\}=$

(A) $\frac{7}{17}$
(B) $-\frac{7}{17}$
(C) $\frac{17}{7}$
(D) $-\frac{17}{7}$

Q6 $\sin\left(2\tan^{-1}\frac{2}{3}\right)+\cos\left(\tan^{-1}\sqrt{3}\right)=$

(A) $\frac{23}{27}$
(B) $\frac{22}{25}$
(C) $\frac{26}{37}$
(D) $\frac{37}{26}$

Q7 $\sin\left(2\sin^{-1}0.6\right)=$

(A) 0.81
(B) 0.6
(C) 0.96
(D) 1

Q8 $\sin\left(3\sin^{-1}0.4\right)=$

(A) 1.2
(B) 0.256
(C) 0.944
(D) None of these

Q9 $\frac{1}{2}\tan^{-1}\frac{12}{5}=$

(A) $\tan^{-1}\frac{3}{2}$
(B) $\tan^{-1}\frac{2}{3}$
(C) $\tan^{-1}\frac{1}{2}$
(D) None of these

Q10 If $3\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then x is $+2\tan^{-1}\left(\frac{2x}{1-x^2}\right)=\frac{\pi}{3}$ equal

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

Answer Key

Q1	D
Q2	B
Q3	B
Q4	A
Q5	B
Q6	D
Q7	C
Q8	C
Q9	B
Q10	A

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

We have,

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

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

Video Solution:

Q2 Text Solution:

$$2\sin^{-1}\frac{3}{5}-\tan^{-1}\frac{17}{31}$$

$$=\ 2\tan^{-1}\frac{3}{4}-\tan^{-1}\frac{17}{31}$$

$$\left[\because \sin^{-1}\frac{3}{5}=\tan^{-1}\frac{3}{4}\right]$$

$$=\ \tan^{-1}\left\{\frac{2\times\frac{3}{4}}{1-\left(\frac{3}{4}\right)^2}\right\}-\tan^{-1}\frac{17}{31}$$

$$\left[\because 2\tan^{-1}x=\tan^{-1}\frac{2x}{1-x^2}\text{ for }\left|x\right|<1\right]$$

$$=\tan^{-1}\frac{24}{7}-\tan^{-1}\frac{17}{13}$$

$$=\tan^{-1}\left(\frac{\frac{24}{7}-\frac{17}{31}}{1+\frac{24}{7}\times\frac{17}{31}}\right)=\tan^{-1}1=\frac{\pi}{4}$$

Video Solution:

Q3 Text Solution:

Let $\tan^{-1}\frac{12}{5}=\theta$

$$\Rightarrow \tan\theta=\frac{12}{5}$$

$$\therefore\quad \sin\left(2\tan^{-1}\frac{12}{5}\right)=\sin 2\theta$$

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

$$=\frac{2\times\frac{12}{5}}{1+\left(\frac{12}{5}\right)^2}$$

$$=\frac{\frac{24}{5}}{\frac{169}{25}}$$

$$=\frac{24}{5}\times\frac{25}{169}$$

$$=\frac{120}{169}$$

Video Solution:

Q4 Text Solution:

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

$$\Rightarrow \sin\theta=\frac{3}{5}$$

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

$$=1-2\sin^2\theta$$

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

$$=1-\frac{18}{25}$$

$$=\frac{7}{25}$$

Video Solution:

Q5 Text Solution:

$$\tan\left\{2\tan^{-1}\frac{1}{5}-\frac{\pi}{4}\right\}$$

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

$$\left[\because 2\tan^{-1}x=\tan^{-1}\left(\frac{2x}{1-x^2}\right),\ \text{if }\left|x\right|<1\right]$$

$$= \tan\left\{\tan^{-1}\frac{5}{12} - \tan^{-1}1\right\}$$

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

$$= \tan\left\{\tan^{-1}\left(\frac{-7}{17}\right)\right\} = \frac{-7}{17}$$

Video Solution:

Q6 Text Solution:

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

$$= \sin\left[\sin^{-1}\left(\frac{2\times\frac{2}{3}}{1+\left(\frac{2}{3}\right)^2}\right)\right]$$

$$+ \cos\left(\tan^{-1}\left(\tan\frac{\pi}{3}\right)\right)$$

$$= \sin\left[\sin^{-1}\left(\frac{12}{13}\right)\right] + \cos\frac{\pi}{3}$$

$$= \frac{12}{13} + \frac{1}{2} = \frac{37}{26}$$

Video Solution:

Q7 Text Solution:

$$\sin\left(2\sin^{-1}0.6\right)$$

$$= \sin\left[\sin^{-1}\left\{2\times 0.6\times\sqrt{1-(0.6)^2}\right\}\right]$$

$$\left[\because 2\sin^{-1}x = \sin^{-1}\left(2x\sqrt{1-x^2}\right)\right]$$

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

Video Solution:

Q8 Text Solution:

Using $\left(3\sin^{-1}x = \sin^{-1}\left(3x-4x^3\right)\right)$, we obtain

$$\sin\left(3\sin^{-1}0.4\right)$$

$$= \sin\left[\sin^{-1}\left\{3\times 0.4 - 4\times(0.4)^3\right\}\right]$$

$$= \sin\left\{\sin^{-1}\left(1.2-0.256\right)\right\}$$

$$= \sin\left\{\sin^{-1}\left(0.944\right)\right\} = 0.944$$

Video Solution:

Q9 Text Solution:

Let $\frac{1}{2}\tan^{-1}\frac{12}{5} = \theta$

$$\Rightarrow \tan^{-1}\frac{12}{5} = 2\theta$$

$$\Rightarrow \frac{12}{5} = \tan(2\theta)$$

$$\Rightarrow \frac{12}{5} = \frac{2\tan\theta}{1-\tan^2\theta}$$

$$\Rightarrow 12 - 12\tan^2\theta = 10\tan\theta$$

$$\Rightarrow 6\tan^2\theta + 5\tan\theta - 6 = 0$$

$$\Rightarrow (3\tan\theta - 2)(2\tan\theta + 3) = 0$$

$$\Rightarrow \tan\theta = \frac{2}{3} \text{ or } \tan\theta = -\frac{3}{2}$$

$$\theta = \tan^{-1}\frac{2}{3} \text{ or } \theta = \tan^{-1}\left(-\frac{3}{2}\right)$$

$$\therefore \frac{1}{2}\tan^{-1}\frac{12}{5} = \tan^{-1}\frac{2}{3}$$

$$(\because \tan^{-1}\text{x} > 0 \text{ when } x > 0)$$

Video Solution:

Q10 Text Solution:

We know $\sin^{-1}\left(\frac{2x}{1+x^2}\right)= 2\tan^{-1} x$

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

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

$\therefore 3\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$

$+2\tan^{-1}\left(\frac{2x}{1-x^2}\right)= \frac{\pi}{3}$

$\Rightarrow 3\left(2\tan^{-1} x\right)-4\left(2\tan^{-1} x\right)$

$+2\left(2\tan^{-1} x\right)= \frac{\pi}{3}$

$\Rightarrow 6\tan^{-1} x - 8\tan^{-1} x + 4\tan^{-1} x = \frac{\pi}{3}$

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

$\Rightarrow \tan^{-1} x = \frac{\pi}{6}$

$\Rightarrow x = \tan\frac{\pi}{6}$

$\Rightarrow x = \frac{1}{\sqrt{3}}$

Video Solution: