Inverse Trigonometric Functions

TEST – 01

Q01. Find the principal value of : (a) $\sec^{-1}\left(-\frac{2}{\sqrt{2}}\right)$ (b) $\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$.

Q02. Simplify: $\tan^{-1}(3)+\tan^{-1}(2)+\tan^{-1}(1)$.

Q03. Evaluate: $arc\cos\left(\cos\frac{5\pi}{4}\right)$.

Q04. Solve: $\tan^{-1}x+\tan^{-1}(1-x)=\cot^{-1}\left(\frac{7}{9}\right)$, $x\in(0,1)$.

Q05. Prove that: $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=\frac{x}{2}\quad\forall x\in\left(0,\frac{\pi}{4}\right)$

OR Show that: $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right)=\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x,\ -\frac{1}{\sqrt{2}}\le x\le 1$.

Q06. Simplify: $\sin\cot^{-1}\tan\cos^{-1}x$.

Q07. Solve: $\left(\tan^{-1}x\right)^2+\left(\cot^{-1}x\right)^2=\frac{5\pi^2}{8}$.

Q08. If $\sin^{-1}x=\frac{\pi}{5}$ for some $x\in[-1,1]$ then, find the value of $\cos^{-1}x$.

Q09. If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=\pi$ then, prove that $x^2+y^2+z^2+2xyz=1$.

Q10. It is given that $\tan^{-1}2$ and $\tan^{-1}3$ are two angles of a triangle. Find the remaining angle of the triangle.

TEST – 02

Q01. Find the principal value of $\cot^{-1}\left(-\sqrt{3}\right)$.

Q02. Evaluate: $\tan^{-1}\left\{2\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)\right\}$.

Q03. Simplify: $\tan\left\{\sin^{-1}\left(\frac{3}{5}\right)+\cot^{-1}\left(\frac{3}{2}\right)\right\}$.

Q04. Express $\tan^{-1}\left(\frac{a\cos x-b\sin x}{b\cos x+a\sin x}\right)$, $\frac{a}{b}\tan x>-1$ in the simplest form.

Q05. Simplify: $\tan\frac{1}{2}\left[\sin^{-1}\left(\frac{2\alpha}{1+\alpha^2}\right)+\cos^{-1}\left(\frac{1-\beta^2}{1+\beta^2}\right)\right]$, $|\alpha|<1, |\beta|>0, \alpha\beta<1$.

OR Determine the value of $x+y+xy$ if $\tan^{-1}x+\tan^{-1}y=\frac{\pi}{4}$.

Q06. Solve: $\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}(8/31)$.

Q07. Prove that: $\tan^{-1}n+\cot^{-1}(n+1)=\tan^{-1}(n^2+n+1)$.

Q08. Solve for x: $\sin^{-1}(1-x)-2\sin^{-1}x=\frac{\pi}{2}$.

Q09. Prove that: $\sin^{-1}\frac{3}{5}-\cos^{-1}\frac{12}{13}=\sin^{-1}\frac{16}{65}$. OR Prove that: $\cos^{-1}\frac{63}{65}+2\tan^{-1}\frac{1}{5}=\sin^{-1}\frac{3}{5}$.

Q10. If $y=\cot^{-1}\sqrt{\cos x}-\tan^{-1}\sqrt{\cos x}$ then, prove that $\sin y=\tan^2(x/2)$.

Answers of Inverse Trigonometric Functions

TEST – 01

Q01. (a) $3\pi/4$ (b) $\pi/6$ Q02. π Q03. $3\pi/4$ Q04. 1/3, 2/3
Q06. x Q07. -1 Q08. $3\pi/10$ Q10. $\pi/4$.

TEST – 02

Q01. $5\pi/6$ Q02. $\pi/4$ Q03. 17/6 Q04. $\tan^{-1}(a/b)-x$
Q05. $\frac{\alpha+\beta}{1-\alpha\beta}$ or 1 Q06. $\frac{1}{4}$ Q08. 0.

 # Any query regarding any question in this test? Write to me on ***theopgupta@gmail.com***