
Board Level Exercise

Type (I): Very Short Answer Type Questions:

01 Mark Each

1. Write the principal value of $\sec^2(-2)$.
2. If $\tan^{-1}\sqrt{3} + \cot^{-1}(x) = \frac{\pi}{2}$, find x .

Type (II): Short Answer Type Questions :

02 Mark Each

1. If $\sin^{-1}(x) + \cos^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{2}$, then find x .
2. Solve for x : $\cos(2\sin^{-1}x) = \frac{1}{9}$, $x > 0$.

Type (III): Long Answer Type Questions:

04 Mark Each

1. Solve the following for x : $\tan^{-1}\left[\frac{1+x}{1-x}\right] = \frac{\pi}{4} + \tan^{-1}x$, $0 < x < 1$.
2. Solve the x : $\cos^{-1}x + \sin^{-1}\left(\frac{x}{2}\right) = \frac{\pi}{6}$.
3. Prove the following : $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$.
4. Prove the following : $\cos\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right) = \frac{6}{5\sqrt{13}}$.

Type (IV): Very Long Answer Type Questions :

06 Mark Each

1. if $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \pi$, prove that $x + y + z = xyz$.
2. Prove that : $\sin^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right) + \sin^{-1}\left(\frac{16}{65}\right) = \frac{\pi}{2}$.
3. Solve the following for x : $\tan^{-1}x + 2\cot^{-1}x = \frac{2\pi}{3}$
4. Solve for x : $\tan^{-1}\frac{x}{2} + \tan^{-1}\frac{x}{3} = \frac{\pi}{4}$; $\sqrt{6} > x > 0$.
5. Prove that : $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{2}{9} = \frac{1}{2}\tan^{-1}\frac{4}{3}$.
6. Prove that : $2\tan^{-1}\frac{3}{4} - \tan^{-1}\frac{17}{31} = \frac{\pi}{4}$.
7. Solve for x : $\tan^{-1}\left(\frac{2x}{1-x^2}\right) + \cot^{-1}\left(\frac{1-x^2}{2x}\right) = \frac{\pi}{3}$, $-1 < x < 1$.

8. Solve for x : $\tan^{-1}(x+2) + \tan^{-1}(x-2) = \tan^{-1}\left(\frac{8}{79}\right)$; $x > 0$.
9. Prove that : $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$.
10. Prove the following : $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$.
-

Exercise # 1

PART - I : SUBJECTIVE QUESTIONS

A Definition, graphs and fundamentals

A-1 Find the simplified value of each of the following inverse trigonometric terms :

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

A-2 Find the simplified value of the following expressions :