

ASSIGNMENT CLASS XII INVERSE TRIGONOMETRY

Q1. Find the principle value of the following:

(a) $\sin^{-1}\left(\frac{-1}{\sqrt{2}}\right)$ (b) $\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ (c) $\tan^{-1}(-\sqrt{3})$ (d) $\sec^{-1}(-2)$ (e) $\operatorname{cosec}^{-1}(-\sqrt{2})$

(f) $\sin^{-1}\left(\sin\frac{3\pi}{4}\right)$ (g) $\cos^{-1}\left(\cos\frac{5\pi}{4}\right)$ (h) $\tan^{-1}\left(\tan\frac{2\pi}{3}\right)$ (i) $\cos^{-1}\left(\cos\frac{8\pi}{7}\right)$ (j) $\tan^{-1}\left(\tan\frac{5\pi}{6}\right)$

Q2. Evaluate the following:

(a) $\cos\left(\sin^{-1}\left(\frac{-3}{5}\right)\right)$ (b) $\operatorname{cosec}\left(\cos^{-1}\left(\frac{-4}{5}\right)\right)$ (c) $\cos\left(\tan^{-1}\left(\frac{3}{4}\right)\right)$

(d) $\tan\left(\cos^{-1}\left(\frac{8}{17}\right)\right)$ (e) $\tan\left(2\tan^{-1}\left(\frac{1}{5}\right) - \frac{\pi}{4}\right)$ (f) $\sin\left(2\cos^{-1}\left(\frac{-3}{5}\right)\right)$

Q3. Prove the following:

(a) $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$ (b) $\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65} = \frac{\pi}{2}$

(c) $2\tan^{-1}\frac{1}{5} + \sec^{-1}\left(\frac{5\sqrt{2}}{7}\right) + 2\tan^{-1}\frac{1}{8} = \frac{\pi}{4}$ (d) $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} = \tan^{-1}\frac{3}{5} + \tan^{-1}\frac{1}{4} = \frac{\pi}{4}$

(e) $2\cot^{-1}5 + \cot^{-1}7 + 2\cot^{-1}8 = \frac{\pi}{4}$ (f) $2\sin^{-1}\frac{3}{5} - \tan^{-1}\frac{17}{31} = \frac{\pi}{4}$

(g) $\sin^{-1}\frac{5}{13} + \cos^{-1}\frac{3}{5} = \tan^{-1}\frac{63}{16}$ (h) $\cos^{-1}\frac{4}{5} + \tan^{-1}\frac{3}{5} = \tan^{-1}\frac{27}{11}$

(i) $\tan^{-1}1 + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(\frac{-1}{2}\right) = \frac{3\pi}{4}$ (j) $\sin\left[\tan^{-1}\left(\frac{1-x^2}{2x}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right] = 1$

Q4. Write the following in the simplest form:

(a) $\tan^{-1}\left(\frac{\sin x}{1 + \cos x}\right)$ (b) $\tan^{-1}\left(\frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}}\right)$ (c) $\tan^{-1}\left(\frac{\cos 2x}{1 + \sin 2x}\right)$

(d) $\tan^{-1}\frac{\sqrt{a-x}}{\sqrt{a+x}}$ (e) $\cos\left(\tan^{-1}\left(\sin\left(\cot^{-1}x\right)\right)\right)$ (f) $\cot^{-1}\left(\sqrt{1+x^2} - x\right)$

Q5. Solve the following equations:

(a) $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1}x$ (b) $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\frac{6}{17}$ (c) $\sin^{-1}x + \sin^{-1}2x = \frac{\pi}{3}$

(d) $\cos^{-1}x + \sin^{-1}\frac{x}{2} = \frac{\pi}{6}$ (e) $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$ (f) $4\sin^{-1}x + \cos^{-1}x = \pi$

ANSWERS

1. (a) $\frac{-\pi}{4}$ (b) $\frac{5\pi}{6}$ (c) $\frac{-\pi}{3}$ (d) $\frac{2\pi}{3}$ (e) $\frac{-\pi}{4}$ (f) $\frac{\pi}{4}$ (g) $\frac{3\pi}{4}$ (h) $\frac{-\pi}{3}$ (i) $\frac{6\pi}{7}$ (j) $\frac{-\pi}{6}$

2. (a) $\frac{4}{5}$ (b) $\frac{5}{3}$ (c) $\frac{4}{5}$ (d) $\frac{15}{8}$ (e) $\frac{-7}{17}$ (f) $\frac{-24}{25}$ 4. (a) $\frac{x}{2}$ (b) $\frac{\pi}{4} + \frac{1}{2}\cos^{-1}x^2$ (c) $\frac{\pi}{4} - x$ (d) $\frac{1}{2}\cos^{-1}\frac{x}{a}$

e) $\sqrt{\frac{x^2+1}{x^2+2}}$ (f) $\frac{\pi}{4} + \frac{1}{2}\tan^{-1}x$ 5. (a) $\frac{1}{\sqrt{3}}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}\sqrt{\frac{3}{7}}$ (d) ± 1 (e) $\frac{\sqrt{3}}{2}$ (f) $\frac{1}{2}$