Inverse Trigonometric Functions

Q.No.1:
If x, y, z are in A.P. and $\tan^{-1}x$, $\tan^{-1}y$, and $\tan^{-1}z$, are also in A.P., then :

JEE 2013

A. $x = y = z$
B. $2x = 3y = 6z$
C. $6x = 3y = 2z$
D. $6x = 4y = 3z$

Q.No.2: Let $\tan^{-1} y = \tan^{-1} x + \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $|x| < \frac{1}{\sqrt{3}}$. Then a value of y is:

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A. $\frac{3x-x^3}{1-3x^2}$
B. $\frac{3x+x^3}{1-3x^2}$
C. $\frac{3x-x^3}{1+3x^2}$
D. $\frac{3x+x^3}{1+3x^2}$

Q.No.3: If $\cos^{-1}\left(\frac{2}{3x}\right)+\cos^{-1}\left(\frac{3}{4x}\right)=\frac{\pi}{2}\left(x>\frac{3}{4}\right)$, then x is equal to:

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A. $\frac{\sqrt{145}}{12}$

B. $\frac{\sqrt{145}}{10}$

C. $\frac{\sqrt{146}}{12}$

D. $\frac{\sqrt{145}}{11}$

Q.No.4: If $x = \sin^{-1}(\sin 10)$ and $y = \cos^{-1}(\cos 10)$, then $y - x$ is equal to:

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A. 0

B. 10

C. 7π

D. π

Q.No.5: All x satisfying the inequality $(\cot^{-1} x)^2 - 7(\cot^{-1} x) + 10 > 0$, lie in the interval:

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A. $(-\infty, \cot 5) \cup (\cot 4, \cot 2)$

B. $(\cot 2, \infty)$

C. $(-\infty, \cot 5) \cup (\cot 2, \infty)$

D. $(\cot 5, \cot 4)$

Q.No.6: Considering only the principal values of inverse functions, the set $A=\left\{x\geq 0\ :\ \tan^{-1}(2x)+\tan^{-1}(3x)=\frac{\pi}{4}\right\}$

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A. contains two elements

B. contains more than two elements

C. is a singleton

D. is an empty set

Q.No.7: If $\alpha = \cos^{-1}\left(\frac{3}{5}\right)$, $\beta = \tan^{-1}\left(\frac{1}{3}\right)$, where $0 < \alpha, \beta < \frac{\pi}{2}$, then $\alpha - \beta$ is equal to :

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A. $\tan^{-1}\left(\frac{9}{5\sqrt{10}}\right)$

B. $\cos^{-1}\left(\frac{9}{5\sqrt{10}}\right)$

C. $\tan^{-1}\left(\frac{9}{14}\right)$

D. $\sin^{-1}\left(\frac{9}{5\sqrt{10}}\right)$

Q.No.8: If $\cos^{-1} x - \cos^{-1}\frac{y}{2} = \alpha$, where $-1 \le x \le 1$, $-2 \le y \le 2$, $x \le \frac{y}{2}$, then for all x, y, $4x^2 - 4xy\cos\alpha + y^2$ is equal to: **JEE 2019**

A. $4\sin^2 a$

B. $2\sin^2 a$

C. $4\sin^2 a - 2x^2y^2$

D. $4\cos^2 a + 2x^2y^2$

Q.No.9: The value of $\sin^{-1}\left(\frac{12}{13}\right) - \sin^{-1}\left(\frac{3}{5}\right)$ is equal to : **JEE 2019**

A. $\pi - \sin^{-1}\left(\frac{63}{65}\right)$

B. $\frac{\pi}{2} - \sin^{-1}\left(\frac{56}{65}\right)$

C. $\frac{\pi}{2} - \cos^{-1}\left(\frac{9}{65}\right)$

D. $\pi - \cos^{-1}\left(\frac{33}{65}\right)$

Q.No.10: The derivative of $\tan^{-1}\left(\frac{\sin x - \cos x}{\sin x + \cos x}\right)$, with respect to $\frac{x}{2}$, where $\left(x \in \left(0, \frac{\pi}{2}\right)\right)$ is : **JEE 2019**

A. 1

B. $\frac{2}{3}$

C. $\frac{1}{2}$

D. 2