MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

INVERSE TRIGONOMETRIC FUNCTIONS

Illustration

1. What is the principal value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$?

A. $\frac{2\pi}{3}$

B. $-\frac{\pi}{3}$

C. $\frac{4\pi}{3}$

D. $\frac{5\pi}{3}$

Answer: B

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2. The principal value of $\sin^{-1}\left\{\tan\left(\frac{-5\pi}{4}\right)\right\}$ is

A. $\frac{\pi}{4}$

B. $-\frac{\pi}{4}$

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

D. $-\frac{\pi}{2}$

Answer:

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3. Find the value of $\sin^{-1}\left[\cos\left\{\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right\}\right]$

A. $\frac{\pi}{3}$

B. $\frac{\pi}{6}$

C. $-\frac{\pi}{3}$

D. $-\frac{\pi}{6}$

Answer: B

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4. Find the domain of the function $f(x) = \sin^{-1}(2x - 3)$.

A. $[-1, 1]$

B. $-5, \ -1]$

C. $[1, 2]$

D. $[-2, 2]$

Answer:

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5. The domain of definition of f(X) = $\sin^{-1}\left(-x^2\right)$ is

A. $[-1, 1]$

B. $[0, 1]$

C. $[-1, 0]$

D. $[-2, 23]$

Answer: A

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6. Find the domain of the function $f(x) = \sin^{-1}\sqrt{x-1}$

A. $[-1, 1]$

B. $[0, 1]$

C. $[1, 2]$

D. $[2, 3]$

Answer: C

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7. If $x, y, z \in [-1, 1]$ such that $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = -\frac{3\pi}{2}$, find the value of $x^2 + y^2 + z^2$.

A. 1

B. 3

C. $\frac{3\pi^{23}}{4}$

D. $3\pi^2$

Answer: B

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8. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$ and $f(1) = 2, f(p+q) = f(p) \cdot f(q)$,

, then the value of $x^{f(1)} + x^{f(2)} + z^{f(3)} - \left(\frac{x+y+z}{x^{f(1)} + y^{f(2)} + z^{f(3)}}\right)$ is :

A. 0

B. 1

C. 2

D. 3

Answer:

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9. The domain of definition of $\cos^{-1}(2x-1)$ is

A. $[-1, 1]$

B. $[0, 1]$

C. $[-1, 0]$

D. $[0, 2]$

Answer: B

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10. Find the principal value of $\cos^{-1}\left\{\sin\left[\cos^{-1}\left(\frac{1}{2}\right)\right]\right\}$

A. $\frac{\pi}{3}$

B. $-\frac{\pi}{3}$

C. $\frac{\pi}{6}$

D. $\frac{5\pi}{6}$

Answer: C

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11. If $x,\ y,\ z \in [-1, 1]$ such that $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 0$, find $x + y + z$.

A. -3

B. 3

C. 0

D. 3π

Answer: B

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12. If $x, y, z \in [-1, 1]$ such that $\cos^{-1} x + \cos^{1} y + \cos^{-1} z = 3\pi,$ then find the values of (1). $xy + yz + zy$ and (2). $x(y+z) + y(z+x) + z(x+y)$

A. 0

B. 1

C. 3

D. -3

Answer: C

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13. Find the principal value of $\tan^{-1}\left\{\sin\left(-\frac{\pi}{2}\right)\right\}$

A. $\frac{\pi}{4}$

B. $-\frac{\pi}{4}$

C. $\frac{3\pi}{4}$

D. $\frac{3\pi}{4}$

Answer:

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14. Find the value of: $\tan^{-1}\left[2\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)\right]$

A. $\frac{\pi}{4}$

B. $-\frac{\pi}{4}$

C. $\frac{3\pi}{4}$

D. $\frac{3\pi}{4}$

Answer: A

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15. The value of $\cot\left[\sin^{-1}\left\{\cos\left(\tan^{-1}1\right)\right\}\right]$ is

A. 0

B. -1

C. 1

D. none of these

Answer: C

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16. Find the minimum value of n for which $\frac{\tan^{-1} n}{\pi} > \frac{\pi}{4}, nN\cdot$

A. 2

B. 4

C. 6

D. 1

Answer:

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17. Find the domain of $\sec^{-1}(2x+1)$

A. R

B. [-1,1]

C. $(-\infty, -1] \cup [0, \infty)$

D. $[-\infty, -1] \cup [1, \infty)$

Answer: C

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18. For the principal value, evaluate $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)-2\sec^{-1}\left(2\frac{\tan\pi}{6}\right)$

A. $-\frac{\pi}{3}$

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

C. $\frac{\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B

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19. The vlaue of $\tan^{-1}\sqrt{3}-\sec^{-1}(-2)+\cos ec^{-1}\frac{2}{\sqrt{3}}$ is

A. $\frac{\pi}{3}$

B. $-\frac{\pi}{3}$

C. 0

D. $\frac{4\pi}{3}$

Answer: C

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20. If $\cos ec^{-1}x + \cos ec^{-1}y + \cos ec^{-1}z = -\frac{3\pi}{2}$, find the value of $\frac{x}{y} + \frac{y}{z} + \frac{z}{x}$.

A. 1

B. -3

C. 3

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

Answer:

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21. The value of

$\cot^{-1}(-1) + \cos ec^{-1}(-\sqrt{2}) + \sec^{-1}(2)$ is

A. $\frac{5\pi}{6}$

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

C. $\frac{7\pi}{6}$

D. $\frac{\pi}{6}$

Answer:

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22. The value of $\sin^{-1}\{\sin(-600^\circ)\}$ is

A. $\frac{\pi}{3}$

B. $-\frac{\pi}{3}$

C. $\frac{2\pi}{3}$

D. $-\frac{2\pi}{3}$

Answer: A

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23. Find the principal value of $\left[\cos^{-1}\cos(-680^\circ)\right]$

A. $\frac{\pi}{9}$

B. $\frac{2\pi}{9}$

C. $\frac{4\pi}{9}$

D. $-\frac{\pi}{9}$

Answer: B

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24. The value of $\sin^{-1}(\sin 10)$ is

A. $3\pi - 10$

B. $10 - 3\pi$

C. $3\pi + 10$

D. $4\pi - 10$

Answer: A

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25. The value of $\cos^{-1}(\cos 10)$ is

A. $4\pi - 10$

B. $10 - 4\pi$

C. $3\pi - 10$

D. $10 - 3\pi$

Answer: A

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26. The value of $\tan^{-1}\tan(-6)$ is

A. $2\pi - 6$

B. $2\pi + 6$

C. $6 - 2\pi$

D. $3\pi - 6$

Answer: A

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27. The value of

$$\sin^{-1}\left(\cot\left(\sin^{-1}\sqrt{\frac{2-\sqrt{3}}{4}} + \cos^{-1}.\frac{\sqrt{12}}{4} + \sec^{-1}\sqrt{2}\right)\right)$$ is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{6}$

C. 0

D. $\frac{\pi}{2}$

Answer:

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28. Evaluate: $\cos\left(\frac{\sin^{-1}1}{4}+\frac{\sec^{-1}4}{3}\right)$

A. $\frac{3\sqrt{15}-\sqrt{7}}{16}$

B. $\frac{3\sqrt{15}+\sqrt{7}}{16}$

C. $\frac{\sqrt{7}-3\sqrt{15}}{16}$

D. $\frac{3\sqrt{15}-\sqrt{7}}{4}$

Answer:

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29. Prove the following results: $\tan\left(\frac{\sin^{-1}(5)}{13}+\frac{\cos^{-1}3}{5}\right)=\frac{63}{16}$ (ii) $\sin\left(\frac{\cos^{-1}3}{5}+\frac{\sin^{-1}5}{13}\right)=\frac{63}{65}$

A. $\frac{48}{65}$

B. $\frac{15}{65}$

C. $\frac{33}{65}$

D. $\frac{63}{65}$

Answer:

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30. The value of $\cot\left[\sin^{-1}\left\{\cos\left(\tan^{-1}1\right)\right\}\right]$ is

A. 1

B. $\frac{\sqrt{12}}{3}$

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

D. $\frac{\sqrt{3}}{2}$

Answer: A

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31. $\sec^2\left(\tan^{-1} 2\right) + \operatorname{cosec}^2\left(\cot^{-1} 3\right)$ is equal to

A. 5

B. 10

C. 15

D. 20

Answer: C

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32. The value of $\tan^2\left(\sec^{-1}2\right)+\cot^2\left(\text{cosec}^{-1}3\right)$ is

A. 5

B. 10

C. 11

D. 15

Answer:

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33. Value of $\tan^{-1}\left\{\sin\left(\cos^{-1}\sqrt{\frac{2}{3}}\right)\right\}$ is

A. $\pi/4$

B. $\pi/2$

C. $\pi/3$

D. $\pi/6$

Answer:

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34. If $\alpha = 3\sin^{-1}\left(\frac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\frac{4}{9}\right)$, where the inverse trigonometric functions take only the principal values, then the correct options (s) is (are)

A. $\cos\beta > 0$

B. $\sin\beta < 0$

C. $\cos(\alpha+\beta) > 0$

D. $\cos\alpha < 0$

Answer:

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35. If $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$, then find the value of $\cos^{-1}x + \cos^{-1}y$

A. $\frac{2\pi}{3}$

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

C. $\frac{\pi}{6}$

D. π

Answer: B

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36. If $4\sin^{-1}x + \cos^{-1}x = \pi$, then x is equal to

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

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

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

D. none of these

Answer: A

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37. $\tan\left(\cot^{-1} x\right)$ is equal to

A. $\frac{\pi}{2} - x$

B. $\cot\left(\tan^{-1} x\right)$

C. $\tan x$

D. none of these

Answer: B

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38. The principal values of $\cos^{-1}\left(-\sin\left(\frac{7\pi}{6}\right)\right)$ is

A. $\frac{5\pi}{3}$

B. $\frac{7\pi}{6}$

C. $\frac{\pi}{3}$

D. none of these

Answer:

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39. If $\tan^{-1} x + 2\cot^{-1} x = \frac{2\pi}{3}$ then x =

A. 3

B. $\sqrt{3}$

C. $\sqrt{2}$

D. $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

Answer: B

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40. The vlaue of $\frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 1}{3}$ is

A. 0

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

C. $\frac{\pi}{6}$

D. $\frac{\pi}{4}$

Answer:

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41. If $x > y > 0$, then find the value of $\tan^{-1}.\ \frac{x}{y} + \tan^{-1}\left[\frac{x+y}{x-y}\right]$

A. $\frac{\pi}{2}$

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

C. $\frac{\pi}{4}$

D. $\frac{\pi}{4}$ or $-\frac{3\pi}{4}$

Answer:

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42. $\tan^{-1}\left(\frac{a}{x}\right)+\tan^{-1}\left(\frac{b}{x}\right)=\frac{\pi}{2}$ then $x=$

A. $\sqrt{ab}$

B. $\sqrt{2ab}$

C. 2ab

D. ab

Answer: A

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43. If $\tan^{-1}3+\tan^{-1}x=\tan^{-1}8$, then $x=$ (a) 5 (b) $1/5$ (c) $5/14$ (d) $14/5$

A. 5

B. $\frac{1}{5}$

C. $\frac{5}{14}$

D. $\frac{14}{5}$

Answer: B

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44. The value of $\Sigma_{n=1}^{3} \tan^{-1}\left(\frac{1}{n}\right)$ is

A. 0

B. π

C. $\pi/2$

D. none of these

Answer:

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45. Solve $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1}x(x > 0)$

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

B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

D. 2

Answer: B

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46. If $x > y > 0$, then find the value of $\tan^{-1}.\frac{x}{y} + \tan^{-1}\left[\frac{x+y}{x-y}\right]$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{4}$

C. $\frac{3\pi}{4}$

D. none of these

Answer:

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47. The value of $\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(1+\sum_{k=1}^{n}2k\right)\right)$ is (a) $\frac{23}{25}$ (b) $\frac{25}{23}$ (c) $\frac{23}{24}$ (d) $\frac{25}{26}$

A. $\frac{23}{25}$

B. $\frac{25}{23}$

C. $\frac{23}{24}$

D. $\frac{24}{23}$

Answer:

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48. The number of positive solution satisfying the equation $\tan^{-1}\left(\frac{1}{2x+1}\right)+\tan^{-1}\left(\frac{1}{4x+1}\right)=\tan^{-1}\left(\frac{2}{x^2}\right)$ is

A. 1

B. 2

C. 8

D. 9

Answer:

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49. If $\cos^{-1}\left(\frac{3}{5}\right), \beta = \tan^{-1}\left(\frac{1}{3}\right)$, where $-1 \leq x \leq 1, \ -2 \leq y \leq 2, x \leq \frac{y}{2}$, then for all $x, y, 4x^2 - 4xy\cos\alpha + y^2$ is equal to

A. $-4\sin^2\alpha$

B. $4\sin^2\alpha$

C. 4

D. $2\sin 2\alpha$

Answer:

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50. If $\frac{\cos^{-1} x}{2} + \frac{\cos^{-1} y}{3} = \alpha$, then prove that $9x^2 - 12xy\cos\alpha + 4y^2 = 36\, s \in^2 \alpha$.

A. 36

B. $-36\sin^2\theta$

C. $36\sin^2\theta$

D. $36\cos^2\theta$

Answer:

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51. If $\cos^{-1}\left(\frac{x}{a}\right) + \cos^{-1}\left(\frac{y}{b}\right) = \alpha,$ prove that $\frac{x^2}{a^2} - 2\frac{xy}{ab}\cos\alpha + \frac{y^2}{b^2} = \sin^2\alpha$

A. $\frac{x^2}{a^2} - \frac{2xy}{ab}\cos\alpha + \frac{y^2}{b^2} = \sin^2\alpha$

B. $\frac{x^2}{a^2} - \frac{2xy}{ab}\sin\alpha + \frac{y^2}{b^2} = \cos^2\alpha$

C. $\frac{x^2}{a^2} + \frac{2xy}{ab}\cos\alpha + \frac{y^2}{b^2} = \sin^2\alpha$

D. $\frac{x^2}{a^2} + \frac{2xy}{ab}\sin\alpha + \frac{y^2}{b^2} = \cos^2\alpha$

Answer:

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52. If $|a| < 1 |b| < 1$ and $|x| < 1$ then the solution of $\sin^{-1}\left(\frac{2a}{1+a^2}\right) - \cos^{-1}\left(\frac{1-b^2}{1+b^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$ is

A. $\frac{a-b}{1-ab}$

B. $\frac{1+ab}{a-b}$

C. $\frac{ab-1}{a+b}$

D. $\frac{a-b}{a+ab}$

Answer:

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

A. 3

B. 5

C. 7

D. 11

Answer:

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54. The value of x where $x>0$ and $\tan\left(\sec^{-1}\left(\frac{1}{x}\right)\right)=\sin\left(\tan^{-1}2\right)$ is

A. $\sqrt{5}$

B. $\frac{\sqrt{5}}{3}$

C. 1

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

Answer: B

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55. Find the value of the expression: $\sin\left(2\frac{\tan^{-1}1}{3}\right)+\cos\left(\tan^{-1}2\sqrt{2}\right)$

A. $\frac{12}{13}$

B. $\frac{13}{14}$

C. $\frac{14}{15}$

D. none of these

Answer:

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Section I Solved Mcqs

1. If $\theta \in \left[\frac{\pi}{2}, 3\frac{\pi}{2}\right] then \sin^{-1}(\sin\theta)$ equals

A. θ

B. $\pi - \theta$

C. $2\pi - \theta$

D. $-\pi + \theta$

Answer: B

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2. $\tan^{-1}\left(\tan\sqrt{1-\theta}\right) = \sqrt{1-\theta}$ when

A. $-\frac{\pi}{2} < \theta\frac{\pi}{2}$

B. $\theta > \frac{4-\pi}{4}$

C. $\theta < \frac{4-\pi}{4}$

D. $\frac{4-\pi^2}{4} < \leq 1$

Answer:

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3. A root of the equation $17x^2 + 17x \tan\left[2\tan^{-1}\left(\frac{1}{5}\right) - \frac{\pi}{4}\right] - 10 = 0$ is (i) $\frac{10}{17}$ (ii) -1 (iii) $-\frac{7}{17}$ (iv) 1

A. $\frac{10}{17}$

B. -1

C. $-\frac{7}{17}$

D. 1

Answer:

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4. The set of values of x for which

$$\frac{\tan^{-1}(x)}{\sqrt{1-x^2}} = \sin^{-1} x \text{ holds is}$$

A. R

B. $[-1, 1]$

C. $(0, 1)$

D. $[-1, 0]$

Answer:

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5. $\cos^{-1}\left\{\frac{1}{2}x^2 + \sqrt{1+x^2}\frac{\sqrt{1-x^2}}{4}\right\} = \cos^{-1}\left(\frac{x}{2}\right) - \cos^{-1} x$

A. $x \in [-1, 1]$

B. $x \in R$

C. $x \in [0, 1]$

D. $x \in [-1, 0]$

Answer:

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6. If $x \in \left[-\frac{1}{2}, 1\right] then \sin^{-1}\left(\frac{\sqrt{3}}{2}x - \frac{1}{2}\sqrt{1-x^2}\right)$

A. $\frac{\sin^{-1}1}{2} - \sin^{-1}x$

B. $\sin^{-1}x - \frac{\pi}{6}$

C. $\sin^{-1}x + \frac{\pi}{6}$

D. none of these

Answer:

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7. $\cos ec^{-1}(\cos x)$ is defined if

A. $x \in [-1, 1]$

B. $x \in R$

C. $x = (2n+1)\frac{\pi}{2}, n \in z$

D. $x = n\pi, n \in z$

Answer: D

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8. If $0 < x < 1$,then $\tan^{-1}\left(\frac{\sqrt{1-x^2}}{1+x}\right)$ is equal to

A. $\frac{1}{2}\cos^{-1} x$

B. $\frac{\cos^{-1}\sqrt{1+x}}{2}$

C. $\frac{\sin^{-1}\sqrt{1-x}}{2}$

D. all the above

Answer:

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9. Solve `sin^(-1)[((2x^2+4)/(1+x^2))]

A. $x \in [-1, 0]$

B. $x \in [0, 1]$

C. $x \in (-1, 1)$

D. $x \in (1, \infty)$

Answer:

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10. $\cos\left[\tan^{-1}\left\{\tan\left(\frac{15\pi}{4}\right)\right\}\right]$

A. $\frac{1}{\sqrt{2}}$

B. $-\frac{1}{\sqrt{2}}$

C. 1

D. none of these

Answer: A

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11. If $\Sigma_{r=1}^{n} \cos^{-1} x_r = 0, then \Sigma_{r=1}^{n} x_r$ equals

A. 0

B. n

C. $\frac{n(n+1)}{2}$

D. none of these

Answer:

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12. If $\Sigma_{r=1}^{2n} \sin^{-1} x^r = n\pi, then \Sigma\_(r=1)^{2n} x_r$ is equal to

A. n

B. 2n

C. $\frac{n(n+1)}{2}$

D. none of these

Answer:

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13. If $\sin^{-1}\left(x-\frac{x^2}{2}+\frac{x^3}{4}-..\right)+\cos^{-1}\left(x^2-\frac{x^4}{2}+\frac{x^6}{4}\right)=\frac{\pi}{2}$ for `0<|x|

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

B. 1

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

D. -1

Answer:

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14. If $\sin^{-1}\sqrt{x^2+2x+1}+\sec^{-1}\sqrt{x^2+2x+1}=\frac{\pi}{2}; x\neq 0,$ then the value of $2\sec^{-1}\left(\frac{x}{2}\right)+\sin^{-1}\left(\frac{x}{2}\right)$ is equal to

A. $-\frac{\pi}{2}$ only

B. $\left\{-\frac{3\pi}{2},\frac{\pi}{2}\right\}$

C. $\frac{3\pi}{2}$ only

D. $-\frac{3\pi}{2}$ only

Answer:

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15. Find the values of sin (cos−1 3/5)

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16. The set of values of x, satisfying the equation $\tan^2\left(\sin^{-1}x\right) > 1$ is

A. $[-1, 1]$

B. $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$

C. $(-1, 1) - \left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$

D. $[-1, 1] - \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

Answer:

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17. If $\cot^{-1}.\frac{n}{\pi} > \frac{\pi}{6}, n \in N$, then the maximum value of n is

A. 1

B. 5

C. 9

D. none of these

Answer:

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18. if $6\sin_1\left(x^2-6x+12\right)=2\pi$, then the value of x, is

A. 1

B. 2

C. 3

D. does not exist

Answer:

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19. Which of the following is the solution set of the equation $\sin^{-1}x=\cos^{-1}x+\sin^{-1}(3x-2)$

A. $\left[0, \frac{1}{3}\right]$

B. $\left[\frac{1}{3}, \frac{2}{3}\right]$

C. $\left[0, \frac{2}{3}\right]$

D. none of these

Answer:

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20. If $\log_2 x \geq 0$ then $\log_{1/\pi}\left\{\sin^{-1}\left(\frac{2x}{1+x^2}\right) + 2\tan^{-1} x\right\}$ is equal

A. $\log_{1/\pi}\left(4\tan^{-1} x\right)$

B. 0

C. -1

D. none of these

Answer:

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21. The value of a for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 1$ has a real solution is $\frac{\pi}{2}$ (b) $-\frac{\pi}{2}$ (c) $\frac{2}{\pi}$ (d) $-\frac{2}{\pi}$

A. $\frac{\pi}{2}$

B. $-\frac{\pi}{2}$

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

D. $-\frac{2}{\pi}$

Answer:

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22. The value of x that satisfies $\tan^{-1}(\tan - 3) = \tan^2 x$ is

A. $\frac{\pi}{3}$

B. $-\frac{\pi}{3}$

C. $\sqrt{\tan^{-1} 3}$

D. `none of these

Answer:

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23. If $\cos^{-1}\left(\frac{n}{2\pi}\right) > \frac{2\pi}{3}$ then maximum and minimum values of integer n are respectively

A. -6 and -3

B. -6 and -4

C. 3 and 6

D. 4 and 6

Answer:

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24. Find the set of values of k for which $x^2 - kx + \sin^{-1}(\sin 4) > 0$ for all real x .

A. ϕ

B. $(-2, 2)$

C. R

D. none of these

Answer:

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25. The set of values of x satisfying $\left|\sin^{-1} x\right| \leq \left|\cos^{-1} x\right|$ is

A. $\left[-1, 1/\sqrt{2}\right)$

B. $\left[-1, 1/\sqrt{2}\right] \cup \left[1/\sqrt{2}, 1\right]$

C. $\left(-1, 1/\sqrt{2}\right)$

D. none of these

Answer:

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26. If $\left[\cot^{-1} x\right] + \left[\cos^{-1} x\right] = 0$, where [] denotes the greatest integer functions, then the complete set of values of x is $(\cos 1, 1)$ (b) $\cos 1, \cos 1)$ $(\cot 1, 1)$ (d) none of these

A. $(\cos 1, 1]$

B. $(\cos 1, \cot 1)$

C. $(\cot 1, 1]$

D. none of these

Answer:

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27. The number of real solutions of $\tan^{-1}\sqrt{x(x+1)}+\sin^{-1}\sqrt{x^2+x+1}=\frac{\pi}{2}$ is z ero b. one c. two d. infinite

A. 0

B. 1

C. 2

D. infinite

Answer:

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28. Find the number of real solutions to the equation $\sqrt{1+\cos 2x}=\sqrt{2}\sin^{-1}(\sin x),\ -\pi\leq x\leq\pi.$

A. 0

B. 1

C. 2

D. infinite

Answer:

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29. The number of solution of

$$\sin\left\{\sin^{-1}\left(\log_{1/2} x\right)\right\} + 2\left|\cos\left\{\sin^{-1}\left(\frac{x}{2} - \frac{3}{2}\right)\right\}\right| = 0 \text{ is}$$

A. 1

B. 2

C. 3

D. none of these

Answer: A

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30. The value of $\tan\left(\sin^{-1}\left(\cos\left(\sin^{-1}x\right)\right)\right)\tan\left(\cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)\right), where x \in (0,1),$ is equal to (a) 0 (b) 1 (c) -1 (d) none of these

A. 0

B. 1

C. -1

D. none of these

Answer:

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31. A value of x satisfying $\tan\left(\sec^{-1}x\right) = \sin\left(\cos^{-1}.\frac{1}{\sqrt{5}}\right)$ is

A. $\pm\frac{\sqrt{5}}{3}$

B. $\pm\frac{3}{\sqrt{5}}$

C. $\pm\frac{\sqrt{3}}{5}$

D. $\pm\frac{3}{5}$

Answer: D

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32. Exhaustive set of values of parameter 'a' so that $\sin^{-1}x-\tan^{-1}x=a$ has a solution is

A. $[-\pi/6,\pi/6]$

B. $[-\pi/4,\pi/4]$

C. $(-\pi/2,\pi/2)$

D. none of these

Answer:

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33. If $a \leq \sin^{-1} x + \cos^{-1} x + \tan^{-1} x \leq b$, then:

A. $\alpha = \frac{\pi}{4}, \beta = \frac{3\pi}{4}$

B. $\alpha = -\pi, \beta = 2\pi$

C. $\alpha = 0, \beta = \pi$

D. none of these

Answer:

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34. If $-1 \leq x \leq 0$ then $\sin^{-1} x$ equals

A. $\pi - \sin^{-1} \sqrt{1 - x^2}$

B. $\tan^{-1}\left(\frac{x}{\sqrt{1 - x^2}}\right)$

C. $-\cot^{-1}\left(\frac{\sqrt{1 - x^2}}{x}\right)$

D. none of these

Answer:

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35. If $\tan^{-1}\left(\frac{x+1}{x-1}\right)+\tan^{-1}\left(\frac{x-1}{x}\right)=\tan^{-1}(-7)$, then the value of x is (a) 0 (b) -2 (c) 1 (d) 2

A. 2

B. 3

C. 4

D. none of these

Answer:

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36. Using mathematical induction , prove that $\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{7}\right)+\ldots.+\tan^{-1}\left(\frac{1}{n^2+n+1}\right)=\tan^{-1}\left(\frac{n}{n+}\right.$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{2\pi}{3}$

D. 0

Answer:

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37. If $-1 \leq x \leq 0$ then

$\tan\left\{\frac{1}{2}\frac{\sin^{-1}(2x)}{1+x^2} + \frac{1}{2}\frac{\cos^{-1}(1-x^2)}{1+x^2}\right\}$ is equal to

A. $\frac{2x}{1-x^2}$

B. 0

C. $\frac{2x}{1+x^2}$

D. x

Answer:

Watch Video Solution

38. If $-1 \leq x \leq 0$ then $\tan\left\{\frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\frac{1}{2}\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$ is equal to

A. $\frac{2x}{1-x^2}$

B. 0

C. $\frac{2x}{1+x^2}$

D. x

Answer:

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39. $\sin\left[\tan^{-1}.\frac{1-x^2}{2x}+\cos^{-1}.\frac{1-x^2}{1+x^2}\right]$ is

A. 1

B. -1

C. 0

D. none of these

Answer: A

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40. If $-1 \leq x \leq 0$ then $\sin\left\{\tan^{-1}\left(\frac{1-x^2}{2x}\right) - \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right\}$ is equal to

A. 1

B. -1

C. 0

D. none of these

Answer:

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41. If $\left|\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right| < \frac{\pi}{3}$, then x belongs to the interval

A. $\left[-1/\sqrt{3}, 1/\sqrt{3}\right]$

B. $\left(-1/\sqrt{3}, 1/\sqrt{3}\right)$

C. $\left(0, 1/\sqrt{3}\right)$

D. none of these

Answer:

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42. Find the value of, $\cos\left[\tan^{-1}\left\{\sin\left(\cot^{-1}x\right)\right\}\right]$

A. $\frac{\sqrt{x^2+2}}{x^2+3}$

B. $\frac{\sqrt{x^2+2}}{x^2+1}$

C. $\frac{\sqrt{x^2+1}}{x^2+2}$

D. none of these

Answer:

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43. Find the value of $\sin^{-1}\left(\cos\left(\sin^{-1}x\right)\right)+\cos^{-1}\left(\sin\left(\cos^{-1}x\right)\right)$

A. $\frac{\pi}{4}$

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

C. $\frac{3\pi}{4}$

D. 0

Answer: B

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44. If $\left(\sin^{-1}x\right)^2+\left(\cos^{-1}x\right)^2=\frac{5\pi^2}{8}$ then x =

A. ± 1

B. $\pm\frac{1}{2}$

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

D. none of these

Answer:

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45. $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x\right), x\neq 0,$ is equation to

A. α

B. 2α

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

D. none of these

Answer: C

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46. The solution set of the equation

$\cos^{-1} x - \sin^{-1} x = \sin^{-1}(1 - x)$ is

A. $[-1, 1]$

B. $[0, 1/2]$

C. $[-1, 0]$

D. none of these

Answer:

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47. Number of triplets (x, y, z) satisfying $\sin^{-1} x + \cos^{-1} y + \sin^{-1} z = 2\pi$, is :

A. 0

B. 2

C. 1

D. infinite

Answer:

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48. The complete set of values of x satisfying the inequality $\sin^{-1}(\sin 5) > x^2 - 4x$ is $\left(2 - \sqrt{\lambda - 2\pi}, 2 + \sqrt{\lambda - 2\pi}\right)$, then $\lambda =$

A. $x \in \left(2 + \sqrt{9 - 2\pi}, \infty\right)$

B. $x \in 2 - \sqrt{9 - 2\pi}, 2 + \sqrt{9 - 2\pi}$

C. $x \in 2 - \sqrt{9 - 2\pi}, \infty$

D. none of these

Answer:

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49. If $\cos^{-1}(\cos 4) > 3x^2 - 4x$ then

A. $x \in \left(-\infty, \frac{2-\sqrt{6\pi-8}}{3}\right.$

B. $x \in \left(\frac{2+\sqrt{6\pi-87}}{3}, \infty\right)$

C. $x \in \left(\frac{2+\sqrt{6\pi-8}}{3}, \infty\right)$

D. $x \in \left(\frac{2-\sqrt{p6\pi-8}}{3}, \frac{2+\sqrt{6\pi-8}}{3}\right.$

Answer: ∞

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50. The number of real solutions (x, y), where $|y| = \sin x, y = \cos^{-1}(\cos x), -2\pi \leq x \leq 2\pi$, is :

A. 2

B. 1

C. 3

D. 4

Answer: C

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51. If $u = \cot^{-1}\sqrt{\cos\theta} - \tan^{-1}\sqrt{\cos\theta}$ then sin u=

A. $\sin^2\theta$

B. $\cos^2\theta$

C. $\tan^2\theta$

D. $\tan^2 2\theta$

Answer: C

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52. A value of x satisfying

$\tan\left(\sec^{-1}x\right) = \sin\left(\cos^{-1}.\frac{1}{\sqrt{5}}\right)$ is

A. $\pm\frac{3}{\sqrt{5}}$

B. $\pm\frac{\sqrt{5}}{3}$

C. $\pm\sqrt{\frac{3}{5}}$

D. none of these

Answer: A

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53. The number of the solutions of the equation $2\sin^{-1}\sqrt{x^2+x+1}+\cos^{-1}\sqrt{x^2+x}=\frac{3\pi}{2}$ is

A. 1

B. 0

C. 2

D. ∞

Answer:

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54. If α, β and γ are the three angles with $\alpha = 2\tan^{-1}(\sqrt{2}-1); \beta = 3\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ and $\gamma = \cos^{-1}\left(\frac{1}{3}\right)$, then

A. $\alpha g < \beta < y$

B. $\alpha < \gamma < \beta$

C. $\beta < \gamma < \alpha$

D. $\gamma < \beta < \alpha$

Answer:

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55. If $f(x) = \cos^{-1} x + \cos^{-1}\left\{\frac{x}{2} + \frac{1}{2}\sqrt{3-3x^2}\right\}$ then :

A. $\frac{\pi}{3}$

B. $2\frac{\cos^{-1}2}{3} - \frac{\pi}{3}$

C. $\frac{2\pi}{3}$

D. $2cso^{-1}\frac{2}{3}$

Answer:

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56. The trigonometric equation $\sin^{-1}x = 2\sin^{-1}a$ has a solution for all real values (b) $|a| < \frac{1}{a}$ $|a| \leq \frac{1}{\sqrt{2}}$ (d) $\frac{1}{2} < |a| < \frac{1}{\sqrt{2}}$

A. $|a| \leq \frac{1}{\sqrt{2}}$

B. $\frac{1}{2} < |a| < \frac{1}{\sqrt{2}}$

C. all real vaues of a

D. $|a| < \frac{1}{2}$

Answer:

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57. If α is the only real root of the equation $x^3 + bx^2 + cx + 1 = 0(b < c)$, then find the value of $\tan^{-1}\alpha + \tan^{-1}(\alpha^{-1})$

A. $\frac{\pi}{2}$

B. $-\frac{\pi}{2}$

C. 0

D. non existent

Answer:

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58. If $\tan^{-1}\left(\frac{a}{x}\right) + \tan^{-1}\left(\frac{b}{x}\right) + \tan^{-1}\left(\frac{c}{x}\right) + \tan^{-1}\left(\frac{d}{x}\right) = \frac{\pi}{2}$ then $x^4 - x^2(\Sigma ab) + abcd =$

A. -1

B. 0

C. 1

D. 2

Answer:

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59. Let $u = \cot^{-1}\sqrt{\cos 2\theta} - \tan^{-1}\sqrt{\cos 2\theta}$, then the value of sinu is

A. $\tan\theta/2$

B. $\tan^2\theta/2$

C. $\cot\theta/2$

D. $\cot^2\theta/2$

Answer:

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60. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \pi$, prove that: $x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz$

A. 2xyz

B. $x^2 + y^2 + z^2$

C. $xy + yz + zx$

D. none of these

Answer:

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61. If $\cos^{-1}\sqrt{p} + \cos^{-1}\sqrt{1-p} + \cos^{-1}\sqrt{1-q} = \frac{3\pi}{4}$, then the value of q is

A. $\frac{1}{\sqrt{2}}$

B. 1

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

D. $\frac{1}{3}$

Answer:

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62. The solution set of the equation $\sin^{-1} x = 2\tan^{-1} x$ is

A. $\{1, 2\}$

B. $\{-1, 2\}$

C. $\{-1, 1, 0\}$

D. $\{1, 1/2, 0\}$

Answer:

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63. If $\cot\left(\cos^{-1} x\right) = \sec\left\{\tan^{-1}\left(\frac{a}{\sqrt{b^2 - a^2}}\right)\right\}$ then x equals

A. $\frac{b}{s}qr\left(2b^2-a^2\right)$

B. $\frac{a}{s}qr\left(2b^2-a^2\right)$

C. $\frac{\sqrt{b^2-a^2}}{a}$

D. $\frac{\sqrt{b^2-a^2}}{\sqrt{2b-a^2}}$

Answer: D

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64. $\tan^{-1}\left[\frac{C_1x-y}{c_1y+x}\right]+\tan^{-1}\left[\frac{C_2-C_1}{1+C_1C_2}\right]..+\tan^{-1}\left[\frac{1}{c_n}\right]$ is equal to

A. $\frac{\tan^{-1}(y)}{x}$

B. $\tan^{-1}\left(\frac{x}{y}\right)$

C. $-\frac{\tan^{-1}(x)}{y}$

D. none of these

Answer: B

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65. about to only mathematics

A. $\frac{x}{\sqrt{1+x^2}}$

B. x

C. $x\sqrt{1+x^2}$

D. $\sqrt{1+x^2}$

Answer:

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66. $\Sigma_{r=1}^{\infty}\frac{\tan^{-1}(1)}{2r^2} = t$ then tan t is equal to

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

B. 1

C. $\frac{\sqrt{5}}{3}$

D. none of these

Answer:

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67. Let (x,y)be such that

$$\sin^{-1}(ax) + \cos^{-1} y + \cos^{-1}(bxy) = \frac{\pi}{2}$$

If a=1 alnd b=2 then (x,y)lies on

A. $x^2 + y^2 = 1$

B. $\left(x^2 - 1\right)\left(y^2 - 1\right) = 0$

C. y=x

D. $\left(4x^2 - 1\right)\left(y^2 - 1\right) = 0$

Answer:

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68. Let $f:[0,4\pi]\to[0,\pi]$ be defined by $f(x)=\cos^{-1}(\cos x)$. The number of points $x\in[0,4\pi]$ 4satisfying the equation $f(x)=\dfrac{10-x}{10}$ is

A. 2

B. 3

C. 4

D. 5

Answer:

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69. If $\left(\sin^{-1}x+\sin^{-1}y\right)\left(\sin^{-1}Z+\sin^{-1}w\right)=\pi^2$ and n_1,n_2,n_3,n_4 in N value of $\begin{vmatrix} x^{n1} & y^{n2} \\ z^n 3 & w^{n4} \end{vmatrix}$ cannot be equal to

A. -2

B. 0

C. 1

D. 2

Answer:

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70. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi, then x^4 + y^2 + z^4 + 4x^2y^2z^2 = K(x^2y^2$

where K is equal to 1 (b) 2 (c) 4 (d) none of these

A. 1

B. 2

C. 4

D. none of these

Answer:

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71. 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

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

B. $\frac{3x + x^2}{1 + 3x^2}$

C. $\frac{3x - x^3}{1 - 3x^2}$

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

Answer:

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Section Ii Assertion Reason Type

1. Statement -1: If $x < \sqrt{e}$then

$\cot^{-1}\left\{\frac{\log(e/x^2)}{\log(ex^2)}\right\} + \cot^{-1}\left\{\frac{\log(ex^4)}{\log(e^2/x^2)}\right\} = \pi - \tan^{-1} 3$

statement 2: $\frac{\tan^{-1}(x+y)}{1-xy} = \tan^{-1} x + \tan^{-1} y$ if $xy < 1$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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2. solve the equation for the value of x:

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

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3. Satement-1: if $\frac{1}{2} \leq x \leq 1$then

$\cos^{-1} x + \cos^{-1}\left\{\frac{x}{2} + \frac{\sqrt{3-3x^2}}{2}\right\}$ is equal to $\frac{\pi}{5}$

Statement-2:

$\sin^{-1}\left(2x\sqrt{1-x^2} = 2\sin^{-1} x \quad \text{if} \quad x \in -(1)\sqrt{2}, (1)\sqrt{2}\right)$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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4. Statement-1:

$$\cos ec^{-1}\frac{3}{2}+\cos^{-1}\left(\frac{2}{3}\right)-2\cot^{-1}\left(\frac{1}{7}\right)-\cot^{-1}7=\cot^{-1}7$$

Statement-2:

$$\cos^{-1}x=\sin^{-1}\left(\frac{1}{x}\right)\text{ and }f\text{ or }x>0\cot^{-1}x=\tan^{-1}\left(\frac{1}{x}\right)$$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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5. Statement-1:

$$\tan\left\{\cos^{-1}\left(\frac{1}{\sqrt{82}}\right)-\sin^{-1}\left(\frac{5}{\sqrt{26}}\right)\right\}=\frac{29}{3}$$

Statement-2: $\left[x\cos\left(\cot^{-1}\right)^2=\frac{51}{50}\rightarrow x-\frac{1}{5}\sqrt{2}\right.$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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6. Statement -1: If a is twice the tangent of the arithmetic mean of $\sin^{-1}x$ and $\cos^{-1}$ x , b the geometric mean of tanx and cot x then

$x^2 - ax + b = 0 \to x = 1$ statement-2: $\tan\left(\frac{\sin^{-1} x + \cos^{-1} x}{2}\right) = 1$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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7. If $a^2 + b^2 = c^2, c \neq 0$, then find the non-zero solution of the equation: $\sin^{-1}.\frac{ax}{c} + \sin^{-1}.\frac{bx}{c} = \sin^{-1} x$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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8. Statement -1: if $-1 \leq x \leq 1 then \sin^{-1}(-x) = -\sin^{-1} x$ and $\cos^{-1}(-x) = \pi - \cos^{-1}$

Statement-2: If $-1 \leq x \leq x then \cos^{-1} x = 2\sin^{-1}\sqrt{\frac{1-x}{2}} = 2\cos^{-1}\sqrt{\frac{1+x}{2}}$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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9. Statement-1: If α, β roots of the equation $18\left(\tan^{-1} x\right)^2 - 9\pi \tan^{-1} x + \pi^2 = 0 then \alpha + \beta = \frac{4}{\sqrt{3}}$ Statement-2: $\sec^2 \cos^{-1}\left(\frac{1}{4}\right) + \cos ec^2 \sin^{-1}\left(\frac{1}{5}\right) = 41$

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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10. If $\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - ..\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4}\right) = \frac{\pi}{2}$ for `0<|x|

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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11. Statement-1:$\sin^{-1}\tan\left(\left(\tan^{-1}\right)x+\tan^{-1}(1-x)\right)\Big] = \frac{\pi}{2}$ has no non zero integral solution Statement-2: The greatest and least values of $\left(\sin^{-1}x\right)^3+\left(\cos^{-1}x\right)^3 are \frac{(7\pi)^3}{8}$ and $\frac{(\pi)^3}{32}$ respectively

A. Statement-1 is is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer:

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Exercise

1. If $\theta \in [4\pi, 5\pi] then \cos^{-1}(\cos\theta)$ equals

A. $-4\pi+\theta$

B. $5\pi-\theta$

C. $4\pi-\theta$

D. $\theta-5\pi$

Answer: A

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2. If $x<0$ then $\tan^{-1}\left(\frac{1}{x}\right)$ equals

A. $\cot^{-1}x$

B. $-\cot^{-1}x$

C. $-\pi+\cot^{-1}x$

D. $-\pi-\cot^{-1}x$

Answer: C

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3. If $\sin^{-1}\left(2x\sqrt{1-x^2}\right) - 2\sin^{-1}x = 0$ then x belongs to the interval

A. $[-1, 1]$

B. $[-1/\sqrt{2}, 1\sqrt{2}]$

C. $[-1, -1/\sqrt{2}]$

D. $[1/\sqrt{2}, 1]$

Answer: B

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4. $4\tan^{-1}\left(\frac{1}{5}\right) - \tan^{-1}\left(\frac{1}{239}\right)$ is equal to

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$

Answer: D

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5. If $\sin\left(\frac{\sin^{-1}1}{5}+\cos^{-1}x\right)=1,$ then find the value of $x\cdot$

A. 1

B. 0

C. $4/5$

D. $1/5$

Answer: D

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6. If $A=\tan^{-1}x, x\in R$ then the value of sin 2A is

A. $\frac{2x}{1-x^2}$

B. $\frac{2x}{\sqrt{1-x^2}}$

C. $\frac{2x}{1+x^2}$

D. $\frac{1-x^2}{1+x^2}$

Answer: C

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7. Find the value of $\sin\left(2\sin^{-1}(0.8)\right)$

A. $\sin 1.2^\circ$

B. $\sin 1.6^\circ$

C. 0.478

D. 0.96

Answer: D

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8. $\tan^{-1}\left(\frac{1}{4}\right)+\tan^{-1}\left(\frac{2}{9}\right)=\frac{1}{2}\tan^{-1}\left(\frac{4}{3}\right)$

A. $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$

B. $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$

C. $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$

D. $\tan^{-1}\left(\frac{1}{2}\right)$

Answer: D

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9. If $\sin^{-1}\left(\frac{x}{5}\right)+\cos ec^{-1}\left(\frac{5}{4}\right)=\frac{\pi}{2}$, then the value of x is

A. 4

B. 5

C. 1

D. 3

Answer: D

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10. prove that $2\frac{\tan^{-1}1}{3}+\frac{\tan^{-1}1}{7}=\frac{\pi}{4}$

A. $\tan^{-1}\left(\frac{49}{29}\right)$

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

C. 0

D. $\frac{\pi}{4}$

Answer: D

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11. $\cos^{-1}\left(\frac{15}{17}\right)+2\tan^{-1}\left(\frac{1}{5}\right)=$

A. $\frac{\pi}{2}$

B. $\frac{\cos^{-1}(171)}{221}$

C. $\frac{\pi}{4}$

D. none of these

Answer: D

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12. The value of $\cot\left[\cos^{-1}\left(\frac{7}{25}\right)\right]$ is

A. $\frac{25}{24}$

B. $\frac{25}{7}$

C. $\frac{24}{25}$

D. none of these

Answer: D

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13. $\sin^{-1}\left(\frac{3}{5}\right)+\tan^{-1}\left(\frac{1}{7}\right)=$

A. $\frac{\pi}{4}$

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

C. $\cos^{-1}\left(\frac{4}{5}\right)$

D. π

Answer: A

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14. The number of solution of the equation $\tan^{-1}(1+x)+\tan^{-1}(1-x)=\frac{\pi}{2}$ is

A. x=1

B. x=-1

C. x=0

D. $x = \pi$

Answer: C

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15. If $x^2 + y^2 + z^2 = r^2, then \tan^{-1}\left(\frac{xy}{zr}\right) + \tan^{-1}\left(\frac{yz}{xr}\right) + \tan^{-1}\left(\frac{xz}{yr}\right)$ is equal to π (b) $\frac{\pi}{2}$ (c) 0 (d) none of these

A. π

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

C. 0

D. none of these

Answer: B

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16. If $x + y + z = xyz$, then $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z =$

A. 0

B. $\pi / 2$

C. 1

D. none of these

Answer: A

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17. If xy +yz+zx=1 then $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z$=

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18. Let x_1 and $x_2 (x_1 > x_2)$ be roots of the equation $\sin^{-1}(\cos(\tan^{-1}(\cos ec(\cot^{-1} x)))) = \frac{\pi}{6}$, then

A. β

B. $\pi/2 - \beta$

C. $\pi - \beta$

D. $-\beta$

Answer: B

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19. The value of $\cos\left(2\cos^{-1}0.8\right)$ is

A. 0.48

B. 0.96

C. 0.6

D. none of these

Answer: D

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20. If $0 \leq x \leq 1 then \cos^{-1}\left(2x^2 - 1\right)$ equals

A. $2\cos^{-1} x$

B. $\pi - 2\cos^{-1} x$

C. $2\pi - 2\cos^{-1} x$

D. none of these

Answer: B

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21. The value of $\tan\left[\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{2}{3}\right)\right]$ is $\frac{6}{17}$ (b) $\frac{7}{16}$ (c) $\frac{16}{7}$ (d) none of these

A. $\frac{6}{17}$

B. $\frac{7}{16}$

C. $\frac{17}{6}$

D. none of these

Answer: C

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22. Evaluate: $\left\{\frac{2\tan^{-1}1}{5}-\frac{\pi}{4}\right\}$ (ii) $\tan\left\{\frac{1}{2}\frac{\cos^{-1}\left(\sqrt{5}\right)}{3}\right\}$

A. $\frac{3+\sqrt{5}}{2}$

B. $3+\sqrt{5}$

C. $\frac{1}{2}(3-\sqrt{5})$

D. none of these

Answer: C

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23. about to only mathematics

A. $\frac{a-b}{1+ab}$

B. $\frac{b}{1+ab}$

C. $\frac{b}{1-ab}$

D. $\frac{a+b}{a-ab}$

Answer: D

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24. The value of $\cot^{-1}\left\{\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right\} is\left(0<x<\frac{\pi}{2}\right)$

A. $\pi-\frac{x}{2}$

B. $2\pi-x$

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

D. $2\pi-\frac{x}{2}$

Answer: A

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25. The value of $\sin\left[\cot^{-1}\left\{\cos\left(\tan^{-1}x\right)\right\}\right]$ is

A. $\frac{\sqrt{x^2+2}}{\sqrt{x^2+1}}$

B. $\frac{\sqrt{x^2+1}}{\sqrt{x^2+2}}$

C. $\frac{x}{\sqrt{x^2+2}}$

D. $\frac{1}{\sqrt{x^2+2}}$

Answer: B

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26. If $x > 1$, then $2\tan^{-1}x + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is equal to (a) $4\tan^{-1}x$ (b) 0 (c) $\frac{\pi}{2}$ (d) π

A. $\tan^{-1}x$

B. 0

C. $\pi/2$

D. π

Answer: D

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27. If $A = \tan^{-1}\left(\frac{x\sqrt{3}}{2k-x}\right)$ and $B = \tan^{-1}\left(\frac{2x-k}{k\sqrt{3}}\right)$, then the value of $A - B$ is :

A. 0°

B. 45°

C. 60°

D. 30°

Answer: D

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28. Solve $\sin^{-1} x + \sin^{-1}(1-x) = \cos^{-1} x$

A. 1,-1

B. 1,0

C. $0, \frac{1}{2}$

D. none of these

Answer: C

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29. If $-1 \leq x \leq 0$ then $\cos^{-1}\left(2x^2 - 1\right)$ equals

A. $2\cos^{-1} x$

B. $\pi - 2\cos^{-1} x$

C. $2\pi - 2\cos^{-1} x$

D. $-2\cos^{-1} x$

Answer: D

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30. If $-1 \leq x \leq -\frac{1}{2}$, then $\sin^{-1}(3x - 4x^3)$ equals

A. $3\sin^{-1} x$

B. $\pi - 3\sin^{-1} x$

C. $-\pi - 3\sin^{-1} x$

D. none of these

Answer: D

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31. $\sin^{-1}(\sin 10)$ is $a + b\pi$ then $|a + b|$ is

A. 10

B. $10 - 3\pi$

C. $3\pi - 10$

D. none of these

Answer: C

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32. The value of $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$ is :

A. 0

B. 1

C. π

D. $-\pi$

Answer: C

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33. The value of $\sin^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right)$ is (a) $\frac{3\pi}{5}$ (b) $-\frac{\pi}{10}$ (c) $\frac{\pi}{10}$ (d) $\frac{7\pi}{5}$

A. $\frac{3\pi}{5}$

B. $\frac{7\pi}{5}$

C. $\frac{\pi}{10}$

D. $\frac{-\pi}{10}$

Answer: D

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34. Find the smallest and the largest values of $\tan^{-1}\left(\frac{1-x}{1+x}\right), 0 \leq x \leq 1$

A. $0, \pi$

B. $0, \frac{\pi}{4}$

C. $-\frac{\pi}{4}, \frac{\pi}{4}$

D. $\frac{\pi}{4}, \frac{\pi}{2}$

Answer: B

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35. The least and the greatest values of $\left(\sin^{-1} x\right)^3 + \left(\cos^{-1} x\right)^3$ are $\frac{-\pi}{2}, \frac{\pi}{2}$ (b) $\frac{-\pi^3}{8}, \frac{\pi^3}{8}$ $\frac{\pi^3}{32}, \frac{7\pi^3}{8}$ (d) none of these

A. $-\frac{\pi}{2}, \frac{\pi}{2}$

B. $-\frac{\pi^3}{8}, \frac{\pi^3}{8}$

C. $\frac{\pi^3}{32}, \frac{7\pi^3}{8}$

D. none of these

Answer: C

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36. If $a \leq \frac{1}{32}$ then the number of solution of $\left(\sin^{-1} x\right)^3 + \left(\cos^{-1} x\right)^3 = a\pi^3$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

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37. If x takes negative permissible value then $\sin^{-1} x =$

A. $\cos^{-1} \sqrt{1 - x^2}$

B. $-\cos^{-1} \sqrt{1 - x^2}$

C. $\cos^{-1} \sqrt{x^2 - 1}$

D. $\pi - \cos^{-1} \sqrt{1 - x^2}$

Answer: B

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38. If $-1 \leq x \leq -\frac{1}{\sqrt{2}}$ then $\sin^{-1} 2x\sqrt{1-x^2}$ equals

A. $2\sin^{-1} x$

B. $\pi - 2\sin^{-1} x$

C. $-\pi - 2\sin^{-1} x$

D. `none of these

Answer: C

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39. If $\frac{1}{\sqrt{2}} \leq x \leq 1 then \sin^{-1} 2x\sqrt{1-x^2}$ equals

A. $2\sin^{-1} x$

B. $\pi - 2\sin^{-1} x$

C. $-\pi - \ -2\sin^{-1} x$

D. none of these

Answer: B

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40. If $0 \leq x \leq 1 then \cos^{-1}\left(2x^2 - 1\right)$ equals

A. $2\cos^{-1} x$

B. $\pi - 2\cos^{-1} x$

C. $2\pi - 2\cos^{-1} x$

D. none of these

Answer: A

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41. If $-1 \leq x \leq 0$ then $\cos^{-1}\left(2x^2 - 1\right)$ equals

A. $2\cos^{-1} x$

B. $\pi - 2\cos^{-1} x$

C. $2\pi - 2\cos^{-1} x$

D. $-2\cos^{-1} x$

Answer: C

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42. If $-\frac{1}{2} \leq x \leq \frac{1}{2} then \sin^{-1} 3x - 4x^3$ equals

A. $3\sin^{-1} x$

B. $\pi - 3\sin^{-1} x$

C. $-\pi - 3\sin^{-1} x$

D. none of these

Answer: A

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43. If $\frac{1}{2} \leq x \leq 1 then \sin^{-1} 3x - 4x^3$ equals

A. $3\sin^{-1} x$

B. $\pi - 3\sin^{-1} x$

C. $-\pi - 3\sin^{-1} x$

D. none of these

Answer: B

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44. If $-1 \leq x \leq -\frac{1}{2}$, then $\sin^{-1}\left(3x - 4x^3\right)$ equals

A. $3\sin^{-1} x$

B. $\pi - 3\sin^{-1}x$

C. $-\pi - 3\sin^{-1}x$

D. none of these

Answer: C

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45. If $\frac{1}{2} \leq x \leq 1 then \cos^{-1}\left(4x^3 - 3x\right)$ equals

A. $3\cos^{-1}x$

B. $2\pi - 3\cos^{-1}x$

C. $-2\pi + 3\cos^{-1}x$

D. none of these

Answer: A

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46. if $-\frac{1}{2} \leq x \leq \frac{1}{2} then \cos^{-1}\left(4x^3 - 3x\right)$ equals

A. $3\cos^{-1} x$

B. $2\pi - 3\cos^{-1} x$

C. $-2\pi + 3\cos^{-1} x$

D. `none of these

Answer: B

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47. if $-1 \leq x \leq -\frac{1}{2} then \cos^{-1}\left(4x^3 - 3x\right)$ equals

A. $3\cos^{-1} x$

B. $2\pi - 3\cos^{-1} x$

C. $-2\pi + 3\cos^{-1} x$

D. none of these

Answer: C

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48. If $0 < x < 1 then \frac{\tan^{-1}(2x)}{1-x^2}$ equals

A. $2\tan^{-1}x$

B. $-\pi + 2\tan^{-1}x$

C. $\pi + 2\tan^{-1}x$

D. none of these

Answer: A

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49. If $x \in (1, \infty) then \tan^{-1}\left(\frac{2x}{1-x^2}\right)$ equals

A. $2\tan^{-1}x$

B. $-\pi + 2\tan^{-1} x$

C. $\pi + 2\tan^{-1} x$

D. none of these

Answer: B

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50. if $x \in (-\infty, -1) then \frac{\tan^{-1}(2x)}{1-x^2}$ equals

A. $2\tan^{-1} x$

B. $-\pi + 2\tan^{-1} x$

C. $\pi + 2\tan^{-1} x$

D. none of these

Answer: C

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51. Prove that

$$3\tan^{-1}x = \begin{cases} \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } -\frac{1}{\sqrt{3}} < x < \frac{1}{\sqrt{3}} \\ \pi + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } x > \frac{1}{\sqrt{3}} \\ -\pi + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } x < -\frac{1}{\sqrt{3}} \end{cases}$$

A. $3\tan^{-1}x$

B. $-\pi + 3\tan^{-1}x$

C. $\pi + 3\tan^{-1}x$

D. none of these

Answer: A

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52. Prove that

$$3\tan^{-1}x = \begin{cases} \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } -\frac{1}{\sqrt{3}} < x < \frac{1}{\sqrt{3}} \\ \pi + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } x > \frac{1}{\sqrt{3}} \\ -\pi + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } x < -\frac{1}{\sqrt{3}} \end{cases}$$

A. $3\tan^{-1}x$

B. $-\pi+3\tan^{-1}$

C. $\pi+3\tan^{-1}x$

D. none of these

Answer: B

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53. Prove that

$$3\tan^{-1}x=\begin{cases}\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } -\frac{1}{\sqrt{3}}<x<\frac{1}{\sqrt{3}}\\ \pi+\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } x>\frac{1}{\sqrt{3}}\\ -\pi+\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) & \text{if } x<-\frac{1}{\sqrt{3}}\end{cases}$$

A. $3\tan^{-1}x$

B. $-\pi+3\tan^{-1}x$

C. $\pi+3\tan^{-1}x$

D. none of these

Answer: C

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54. If $0 \leq x < \infty, then \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ equals

A. $2\tan^{-1} x$

B. $-2\tan^{-1} x$

C. $\pi - 2\tan^{-1} x$

D. $\pi + 2\tan^{-1} x$

Answer: A

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55. If $-\infty < x \leq 0 then \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ equals

A. $2\tan^{-1} x$

B. $-2\tan^{-1}x$

C. $\pi - 2\tan^{-1}x$

D. $\pi + 2\tan^{-1}x$

Answer: B

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56. If $x \in [-1, 1] then \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ equals

A. $2\tan^{-1}x$

B. $\pi - 2\tan^{-1}x$

C. $-\pi - 2\tan^{-1}x$

D. none of these

Answer: A

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57. If $x \in (1, \infty) then \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ equals

A. $2\tan^{-1} x$

B. $\pi - 2\tan^{-1} x$

C. $-\pi - 2\tan^{-1} x$

D. none of these

Answer: B

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58. If $x \in (-\infty, -1) then \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ equals

A. $2\tan^{-1} x$

B. $\pi - 2\tan^{-1} x$

C. $-\pi - 2\tan^{-1} x$

D. none of these

Answer: C

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59. If $\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)=4\tan^{-1}x$ then

A. $x \in -(-\infty, -1)$

B. $x \in (1, \infty)$

C. $x \in [0, 1]$

D. $x \in [-1, 0)$

Answer: C

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60. If $1\tan^{-1}x+\sin^{-1}.\frac{2x}{1+x^2}$ is independent of x, then

A. $x \in [1, \infty) \in (-\infty, -1)$

B. $x \in [-1, 1]$

C. $x \in (-\infty, 1]$

D. none of these

Answer: A

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61. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi then x + y + z$ is equal to

A. xyz

B. 0

C. 1

D. 2 xyz

Answer: A

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62. The value of $\cos\left(\tan^{-1}(\tan 2)\right)$ is

A. $1/\sqrt{5}$

B. $-1/\sqrt{5}$

C. $\cos 2$

D. $-\cos 2$

Answer: D

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63. If $\sec^{-1} x = \cos ec^{-1} y$, then find the value of $\cos^{-1}.\frac{1}{x} + \cos^{-1}.\frac{1}{y}$

A. π

B. $\frac{\pi}{4}$

C. $-\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: D

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64. Let $\cos\left(2\tan^{-1}x\right) = \frac{1}{2}$ then the value of x is

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. $1-\sqrt{3}$

D. $1-\frac{1}{\sqrt{3}}$

Answer: B

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65. If $\tan^{-1}.\frac{x}{\pi} < \frac{\pi}{3}, x \in N$, then the maximum value of x is

A. 2

B. 5

C. 7

D. none of these

Answer: B

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66. Range of the function $f(x) = \cos^{-1}(-\{x\})$, where {.} is fractional part function, is:

A. $\frac{\pi}{2}, 1\Big)$

B. $(\pi), \frac{\pi}{2}$

C. $\left[\frac{\pi}{2}, \pi\right]$

D. $\left(0, \frac{\pi}{2}\right)\Big]$

Answer: C

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67. $\sec^{-1}(\sin x)$ exist if

A. $x on(-\infty, \infty)$

B. $x \in [-1, 1]$

C. $x = (2n+1)\frac{\pi}{2}, x \in Z$

D. $x = n\pi, x \in z$

Answer: C

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68. $\cot\left(\frac{\pi}{4} - 2\cot^{-1} 3\right)$ is :

A. 1

B. 7

C. -1

D. none of these

Answer: B

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69. Solve $\left[\cot^{-1} x\right] + \left[\cos^{-1} x\right] = 0$, where $[.]$ denotes the greatest integer function

A. (cos1,1]

B. (cos 1, cos 1)

C. (cot 1,1]

D. none of these

Answer: D

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70. Find the sum $\cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \ldots\infty$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$

D. none of these

Answer: B

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71. If $\frac{\cos^{-1}(x)}{2} + \frac{\cos^{-1}(y)}{3} = \theta$ then the maximum of $9x^2 - 12xy\cos\theta + 4y^2$ is

A. 18

B. 30

C. 24

D. 36

Answer: D

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72. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \pi$, prove that: $x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz$

A. 2xyz

B. xyz

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

D. $\frac{1}{3}xyz$

Answer: A

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Chapter Test

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

A. $0, \frac{1}{2}$

B. $0, \frac{1}{2}$

C. 0

D. none of these

Answer: C

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2. If $\left(\tan^{-1} x\right)^2 + \left(\cot^{-1} x\right)^2 = \frac{5\pi^2}{8}$, then find x.

A. -1

B. 1

C. 0

D. none of these

Answer: A

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3. If $\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta - \frac{\pi}{3}\right) = K\tan 3\theta$, then K is equal to

A. 1

B. $1/3$

C. 3

D. none of these

Answer: C

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4. If $-1 \leq x \leq -\frac{1}{2}$, then $\sin^{-1}\left(3x - 4x^3\right)$ equals

A. $3\sin^{-1}x$

B. $\pi - 3\sin^{-1}x$

C. $-\pi - 3\sin^{-1}x$

D. none of these

Answer: B

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5. The numerical value of $\tan\left(2\tan^{-1}\left(\frac{1}{5}\right)-\frac{\pi}{4}\right.$ is equal to____

A. 1

B. 0

C. $\frac{7}{17}$

D. $-\frac{7}{17}$

Answer: D

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6. If $\tan(x+y)=33$, and $x=\tan^{-1}3$, then: y=

A. 0.3

B. $\tan^{-1}(1.3)$

C. $\tan^{-1}(0.3)$

D. $\tan^{-1}\left(\frac{1}{18}\right)$

Answer: C

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7. Two angles of a triangle are $\cot^{-1} 2$ and $\cot^{-1} 3$, then the third angle is

A. $\frac{\pi}{4}$

B. $3\frac{\pi}{4}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: B

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8. The greater of the two angles $A = 2\tan^{-1}\left(2\sqrt{2} - 1\right)$ and $B = 3\sin^{-1}\left(\frac{1}{3}\right) + \sin^{-1}\left(\frac{3}{5}\right) is$ ____.

A. A=B

B. $A < B$

C. $A > B$

D. none of these

Answer: C

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9. Let a, b and c be positive real numbers. Then prove that `tan^(-1) sqrt((a(a + b + c))/(bc)) + tan^(-1) sqrt((b (a + b + c))/(ca)) + tan^(-1) sqrt((c(a + b+ c))/(ab)) =' pi'

A. $\pi/4$

B. $\pi/2$

C. π

D. 0

Answer: C

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10. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \frac{3\pi}{2}$ the value of $x^{100} + y^{100} + z^{100} - \frac{9}{x^{101} + y^{101} + z^{101}}$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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11. The value of $\frac{\alpha^3}{2}\cos ec^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\alpha}{\beta}\right)\right)+\frac{\beta^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\beta}{\alpha}\right)\right)$ is equal to

A. $(\alpha-\beta)(\alpha^2-\beta^2)$

B. $(\alpha+\beta)(\alpha^2-\beta^2)$

C. $(\alpha+\beta)(\alpha^2+\beta^2)$

D. none of these

Answer: C

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12. If a,b are positive quantitis and if $a_1=\frac{a+b}{2}, b_1=\sqrt{a_1 b}, a_2=\frac{a_1+b_1}{2}, b_2=\sqrt{a_2 b_1}$ and so on then

A. $a_\infty=\frac{\sqrt{b^2-a^2}}{\cos^{-1}\left(\frac{a}{b}\right)}$

B. $b_\infty = \frac{\sqrt{b^2 - a^2}}{\cos^{-1}\left(\frac{a}{b}\right)}$

C. $b_\infty = \frac{\sqrt{a^2 + b^2}}{\cos^{-1}\left(\frac{b}{a}\right)}$

D. none of these

Answer: B

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13. $\tan\frac{2\pi}{5} - \tan\frac{\pi}{15} - \sqrt{3}\tan\frac{2\pi}{5}\tan\frac{\pi}{15}$ is equal to

A. $-\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. 1

D. $\sqrt{3}$

Answer: D

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14. If $a_1, a_2, a_3, \ldots, a_n$ is an A.P. with common difference d, then prove that

$$\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{d}{1+a_2a_3}\right)+\ldots+\tan^{-1}\left(\frac{d}{1+a_{-1}a_n}\right)\right.$$

A. $\frac{(n-1)d}{a_1+a_n}$

B. $\frac{(n-1)d}{1+a_1a_n}$

C. $\frac{nd}{1+a_1a_n}$

D. $\frac{a_n-a_1}{a_n+a_1}$

Answer: B

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15. If $x=\sin\left(2\tan^{-1}2\right), y=\sin\left(\frac{1}{2}\tan^{-1}\left(\frac{4}{3}\right)\right)$, then -

A. $x=y^2$

B. $y^2=1-x$

C. $x^2=\frac{y}{2}$

D. $y^2 = 1 + x$

Answer: B

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16. Which of the following angles is greater?

$\theta_1 = \sin^{-1} + \frac{\sin^{-1} 1}{3}$ or $\theta_2 = \frac{\cos^{-1} 4}{5} + \frac{\cos^{-1} 1}{3}$

A. $\theta_1 > \theta_2$

B. $\theta_1 = \theta_2$

C. $\theta_1 < \theta_2$

D. none of these

Answer: C

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17. The value of $\cos\left[\frac{1}{2}\cos^{-1}\left\{\cos\left(\sin^{-1}\left(\frac{\sqrt{63}}{8}\right)\right)\right\}\right]$ is

A. $\frac{3}{16}$

B. $\frac{3}{8}$

C. $\frac{3}{4}$

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

Answer: C

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18. Solve for x: - $\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}\left(\frac{8}{31}\right)$

A. $-\frac{1}{4}, 8$

B. $\frac{1}{4}, -8$

C. $-4, \frac{1}{8}$

D. $4, -\frac{1}{8}$

Answer: B

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19. If $\alpha = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) + \sin^{-1}\left(\frac{1}{3}\right), \beta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) + \cos^{-1}\left(\frac{1}{3}\right)$ then

A. $\alpha > \beta$

B. $\alpha = \beta$

C. $\alpha < \beta$

D. $\alpha + \beta = 2\pi$

Answer: C

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20. The sum of the two angles $\cot^{-1} 3$ and $\operatorname{cosec}^{-1}\sqrt{5}$ is

A. $\frac{\pi}{2}$

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

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: C

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21. Show that: $\cos\left(2\frac{\tan^{-1}1}{7}\right) = \sin\left(4^{-1}\frac{1}{3}\right)$

A. $\frac{3}{7}$

B. $\frac{7}{8}$

C. $\frac{8}{21}$

D. none of these

Answer: D

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22. The number of the solutions of the equation $2\sin^{-1}\sqrt{x^2+x+1}+\cos^{-1}\sqrt{x^2+x}=\frac{3\pi}{2}$ is

A. 0

B. 1

C. 2

D. infinite

Answer: B

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23. $\cos\left\{\cos^{-1}\left(-\frac{1}{7}\right)+\sin^{-1}\left(-\frac{1}{7}\right)\right\}$ =

A. $-\frac{1}{3}$

B. None of These

C. $\frac{1}{3}$

D. $\frac{4}{9}$

Answer: B

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24. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi,$ then $xy + yz + zx$ is equal to

A. 1

B. 0

C. -3

D. 3

Answer: D

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25. Evaluate: $\sin\left(\frac{1}{2}\cos^{-1}\frac{4}{5}\right)$

A. $-\frac{1}{\sqrt{10}}$

B. $\frac{1}{\sqrt{10}}$

C. $-\frac{1}{10}$

D. $\frac{1}{10}$

Answer: B

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26. If $x \geq 0$ and $\theta = \sin^{-1}x + \cos^{-1}x - \tan^{-1}x$, then

A. $\frac{\pi}{2} < \theta \leq \frac{3\pi}{4}$

B. $0 \leq \theta \leq \frac{\pi}{4}$

C. $-\frac{\pi}{4} \leq \theta \leq 0$

D. $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$

Answer: D

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27. If $\tan^{-1} a + \tan^{-1} b + \tan^{-1} c = \pi$ then prove tjhat $a + b + c = abc$

A. a+b+c=abc

B. ab+bc+ca=abc

C. $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} - \frac{1}{abc} = 0$

D. $ab + bc + ca = a + b + c$

Answer: A

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28. The value of $\cot\left(\text{cosec}^{-1}\frac{5}{3} + \tan^{-1}\frac{2}{3}\right)$ is :

A. $\frac{4}{17}$

B. $\frac{5}{17}$

C. $\frac{6}{17}$

D. $\frac{3}{17}$

Answer: C

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29. Prove the following : $\sin^{-1}\left(\frac{4}{5}\right) + 2\tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{2}$

A. $\frac{\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{4}$

D. 0

Answer: C

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30. The equation $\sin^{-1} x - \cos^{-1} x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ has

A. no solution

B. unique solution

C. infinite number of solution

D. none of these

Answer: B

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