



MATHS

BOOKS - ML KHANNA

INVERSE CIRCULAR FUNCTIONS

Problem Set 1 Multiple Choice Questions

1. $\cos^{-1}\left(\cos \frac{7\pi}{6}\right) =$

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

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

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

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

Answer: B



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

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

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

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

D. $\frac{5\pi}{4}$

Answer: C

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3. Principal value of $\cos^{-1}\left[\cos\left(\frac{4\pi}{3}\right)\right]$ is

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

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

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

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

Answer: D



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4. The value of $\cos^{-1}(-1) - \sin^{-1}(1)$ is- π b. $\frac{\pi}{2}$ c. $\frac{3\pi}{2}$ d. $-\frac{3\pi}{2}$

A. π

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

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

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

Answer: B



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

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

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

C. $\frac{1}{4}$

D. 1

Answer: D

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6. $\tan^{-2} \tan\left(\frac{3\pi}{4}\right)$

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

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

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

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

Answer: A

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7. Find the value of each of the expression in Exercise 16 to 18:

$$\sin^{-1}\left(\sin \frac{2\pi}{3}\right)$$

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

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

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

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

Answer: C



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

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

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

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

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

Answer: C



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9. Find the value of

$$\cos \left[\cos^{-1} \left(\frac{-\sqrt{3}}{2} \right) + \frac{\pi}{6} \right]$$

A. -1

B. 1

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

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

Answer: A



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10. Evaluate the following: $\cos(\tan^{-1} 3/4)$

A. $\frac{4}{5}$

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

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

D. $\frac{5}{4}$

Answer: A



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11. $\left[\sin\left(\tan^{-1} \frac{3}{4}\right) \right]^2 =$

A. $\frac{9}{16}$

B. $\frac{9}{25}$

C. $\frac{16}{25}$

D. none

Answer: B



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12. Evaluate: $\tan\left\{2\tan^{-1}\frac{1}{5} - \frac{\pi}{4}\right\}$

A. $\frac{5}{4}$

B. $\frac{5}{16}$

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

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

Answer: C



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13. If $\sin^{-1} x = \frac{\pi}{5}$ for some $x \in (-1, 1)$, then : $\cos^{-1} x = \dots$

A. $\frac{3\pi}{10}$

B. $\frac{5\pi}{10}$

C. $\frac{3\pi}{10}$

D. $\frac{9\pi}{10}$

Answer: A



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14. If $\cos^{-1} \frac{1}{x} = \theta$, then $\tan \theta =$

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

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

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

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

Answer: B



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15. If: $A = \tan^{-1} x$, then: $\sin 2A =$

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

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

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

D. none

Answer: C



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16. $\sin(\cot^{-1} x) =$

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

B. x

C. $(1 + x^2)^{-3/2}$

D. $(1 + x^2)^{-1/2}$

Answer: D



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17. $\cos^{-1}\left[\cos\left(-\frac{17}{15}\pi\right)\right]$ is equal to

A. $-\frac{17\pi}{15}$

B. $\frac{17\pi}{15}$

C. $\frac{2\pi}{15}$

D. $\frac{13\pi}{15}$

Answer: D



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18. $\tan(\cos^{-1} x) =$

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

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

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

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

Answer: A



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19. The value of x for which $\sin(\cot^{-1}(1+x)) = \cos(\tan^{-1}x)$ is

A. $1/2$

B. 1

C. 0

D. $-1/2$

Answer: D



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

A. 1

B. 3

C. 4

D. 5

Answer: B



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

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

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

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

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

Answer: B



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22. Find 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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23. The value of $\sin(2 \sin^{-1} 0.8)$ is equal to

A. $\sin 1.2^\circ$

B. $\sin 1.6^\circ$

C. 0.48

D. 0.96

Answer: D

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24. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$

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

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

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

D. π

Answer: B

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25. Find the value of $\sin^{-1}\left(\cos. \frac{33\pi}{5}\right)$.

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

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

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

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

Answer: D



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26. The value of $\cos(2 \cos^{-1} x + \sin^{-1} x)$ at $x = 1/5$ is

A. $-\frac{2\sqrt{6}}{5}$

B. $\frac{2\sqrt{5}}{5}$

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

D. none

Answer: A



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

A. $a = 0, b = \pi$

B. $a = 0, b = \frac{\pi}{2}$

C. $a = \frac{\pi}{2}, b = \pi$

D. none

Answer: A



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28. If $a \leq \tan^{-1} \left(\frac{1-x}{1+x} \right) \leq b$ where $0 \leq x \leq 1$, then $(a, b) =$

A. $(0, \pi)$

B. $(0, \pi/4)$

C. $(-\pi/4, \pi/4)$

D. $(\pi/4, \pi/2)$

Answer: B



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29.

$$\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right) - \tan^{-1}(-\sqrt{3}) + \cot^{-1}\left(-\frac{1}{\sqrt{3}}\right) =$$

A. $\frac{17\pi}{12}$

B. $\frac{11\pi}{12}$

C. $\frac{5\pi}{12}$

D. $\frac{\pi}{12}$

Answer: C



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30. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then $x =$

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

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

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

D. none

Answer: C



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31. 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 $2 \frac{\sec^{-1} x}{2} + \frac{\sin^{-1} x}{2} =$

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

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

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

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

Answer: C



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

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

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

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

D. none

Answer: A



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33. $\cot^{-1}(\cot 4) =$

A. 4

B. $\frac{1}{4}$

C. $4 - \pi$

D. $\pi - 4$

Answer: C



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34. If x satisfies the equation $t^2 - t - 2 > 0$, then there exists a value for

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

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

C. $\sec^{-1} x$

D. none

Answer: C



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35. If $\cos^{-1} x - \sin^{-1} x = 0$, then x is equal to

A. $\sqrt{2}$

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

C. 1

D. $\pm \frac{1}{\sqrt{2}}$

Answer: B



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

A. ab

B. $2ab$

C. \sqrt{ab}

D. $\sqrt{2ab}$

Answer: C



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37. If $f(x) = \sec^{-1} x + \tan^{-1} x$, then $f(x)$ is real for

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

B. $x \in R$

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

D. none

Answer: C



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38. If $\cos^{-1} p + \cos^{-1} q + \cos^{-1} r = 3\pi$, then $pq + qr + rp =$

A. -3

B. 0

C. 3

D. -1

Answer: C

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39. $\sum_{r=1}^{2n} \sin^{-1} x_r = n\pi$ then $\sum_{r=1}^{2n} x_i =$

A. n

B. $2n$

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

D. none

Answer: B

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40. If $y = \cos^{-1}(\cos 10)$, then $y =$

A. 10

B. $4\pi - 10$

C. $2\pi + 10$

D. $2\pi - 10$

Answer: B



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41. $\tan^{-1}(\tan 5) =$

A. 5

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

C. $2\pi - 5$

D. $5 - 2\pi$

Answer: D



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42. If $y = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ then at $x = \frac{3}{2}$, $\frac{dy}{dx}$ is

A. $-8/13$

B. $8/13$

C. $5/12$

D. $-5/12$

Answer: B



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43. The number of solutions of the equation

$$\sin^{-1} \frac{2x}{x^2 + 1} + \cos^{-1} \frac{x^2 - 1}{x^2 + 1} = \pi \text{ is}$$

- A. 1
- B. 2
- C. 0
- D. none

Answer: D



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Problem Set 1 True And False

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



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2. $\cos^{-1} \sqrt{\frac{a-x}{a-b}} = \sin^{-1} \sqrt{\frac{x-b}{a-b}}$ for all values of x .

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Problem Set 2 Multiple Choice Questions

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

A. $\frac{\tan^{-1} 44}{29}$

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

C. 0

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

Answer: D

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2. $\tan \left[\cos^{-1} \frac{4}{5} + \tan^{-1} \frac{2}{3} \right]$ or $\tan \left[\sin^{-1} \frac{3}{5} + \cot^{-1} \frac{3}{2} \right] =$

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

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

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

D. none

Answer: C



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3. Evaluate: $\cos\left(\frac{\sin^{-1} 3}{5} + \frac{\sin^{-1} 5}{13}\right)$

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

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

C. $\frac{23}{65}$

D. $\frac{65}{23}$

Answer: A



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4. $\cos^{-1} \frac{15}{17} + 2 \tan^{-1} \frac{1}{5} =$

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

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

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

D. none

Answer: D



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5. What is the value of $\sin^{-1} \frac{4}{5} + 2 \tan^{-1} \frac{1}{3}$?

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. none

Answer: A



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6. The value of $\frac{\cot^{\pi}}{4} - 2 \cot^{-13}$ is

A. 3

B. 6

C. 7

D. 9

Answer: C



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7. $\tan^{-1} \frac{1}{7} + 2 \tan^{-1} \frac{1}{3} =$

A. $-\pi/4$

B. $\pi/4$

C. $\pi/2$

D. $-\pi/2$

Answer: B

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

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

B. $-\frac{14}{15}$

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

D. None

Answer: A

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9. Find the value of $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/4$ or $-3\pi/4$

Answer: C



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10. If $A = \tan^{-1} \frac{x\sqrt{3}}{2\lambda - x}$ and $B = \tan^{-1} \left(\frac{2x - \lambda}{\lambda\sqrt{3}} \right)$ then the value of

A-B is

A. 0°

B. 30°

C. 45°

D. 60°

Answer: B



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11. Given $\sin^{-1} x + \sin^{-1} \sqrt{1-x^2} = \frac{\pi}{2}$, $0 \leq x \leq \frac{1}{2}$, then the value of $\tan \left[\sin^{-1} \left\{ \frac{x}{\sqrt{2}} + \frac{\sqrt{1-x^2}}{\sqrt{2}} \right\} - \sin^{-1} x \right]$ is

A. -1

B. 1

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

D. $\sqrt{3}$

Answer: B



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12.

Value

of

$$\tan^{-1} \frac{a}{b+c} + \tan^{-1} \frac{b}{c+a}, \text{ if } \angle C = 90^\circ \text{ in } \triangle ABC =$$

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

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

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

D. π

Answer: A[Watch Video Solution](#)

$$13. \cot^{-1} 9 + \frac{\cos^{-1} \sqrt{41}}{4} =$$

A. π

B. $\pi/2$

C. $\pi/4$

D. $\pi/3$

Answer: C



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14. If $\theta = \cot^{-1} 7 + \cot^{-1} 8 + \cot^{-1} 18$, then $\cot \theta$ is

A. 2

B. 3

C. 4

D. 5

Answer: B



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15. $\frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 1}{3} = ?$

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

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

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

D. π

Answer: B



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16. 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. $\frac{\tan^{-1} 1}{18}$

Answer: C



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17. $\sum_{n=1}^3 \frac{\tan^{-1} 1}{n} =$

A. 0

B. $\pi/2$

C. π

D. none

Answer: B



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18. IF $\tan^{-1} 2$, $\tan^{-1} 3$ are two angles of a triangle , then the third angle is

A. 75°

B. 60°

C. 45°

D. 90°

Answer: C



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19. $\tan^{-1} \frac{3}{4} + \tan^{-1} \frac{3}{5} - \tan^{-1} \frac{8}{19} =$

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

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

C. $\frac{5\pi}{8}$

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

Answer: D



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20. Evaluate $\sin^{-1} \frac{4}{5} + \sin^{-1} \frac{5}{13} + \sin^{-1} \frac{16}{65}$

A. $\pi/4$

B. $\pi/2$

C. $3\pi/4$

D. none

Answer: B



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21. $\tan^{-1} 5 + \tan^{-1} 3 - \cot^{-1} \frac{4}{7} =$

A. $\pi/4$

B. $\pi/2$

C. $3\pi/4$

D. none

Answer: B



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22. $\sin^{-1} \frac{12}{13} + \cos^{-1} \frac{4}{5} + \tan^{-1} \frac{63}{16} =$

A. 0

B. $\pi/2$

C. π

D. $3\pi/2$

Answer: C



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23. Prove that

$$\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$$

A. $\pi/2$

B. $\pi/4$

C. π

D. $-\pi/4$

Answer: B



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24. $2 \tan^{-1} \frac{1}{5} + \sec^{-1} \frac{5\sqrt{2}}{7} + 2 \tan^{-1} \frac{1}{8} =$

A. $\pi/2$

B. $-\pi/2$

C. $\pi/4$

D. $-\pi/4$

Answer: C



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25. Prove that

$$4 \tan^{-1} \frac{1}{5} - \tan^{-1} \frac{1}{70} + \tan^{-1} \frac{1}{99} = \frac{\pi}{4}$$

- A. π
- B. $\pi/3$
- C. $\pi/4$
- D. $\pi/2$

Answer: C



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26. $4 \frac{\tan^{-1} 1}{5} - \frac{\tan^{-1} 1}{239}$ is equal o

- A. π
- B. $\pi/2$
- C. $\pi/3$

D. $\pi/4$

Answer: D



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$$27. \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$$

A. $\pi/4$

B. $\pi/3$

C. $\pi/2$

D. π

Answer: A



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$$28. \sin\left[\frac{1}{2}\cot^{-1}\left(-\frac{3}{4}\right)\right] \text{ is equal to}$$

A. $2/\sqrt{5}$

B. $-2/\sqrt{5}$

C. $1/\sqrt{5}$

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

Answer: A



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29. Find the value of $\tan\left(\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right)$

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

B. $\frac{1}{2}(3 + \sqrt{5})$

C. $3 + \sqrt{5}$

D. none

Answer: A



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30. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ is equal to :

A. $\frac{1}{2}\cos^{-1}\frac{3}{5}$

B. $\frac{1}{2}\sin^{-1}\frac{3}{5}$

C. $\frac{1}{2}\tan^{-1}\frac{3}{5}$

D. $\tan^{-1}\frac{1}{2}$

Answer: D



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31. $\cot\left[\cos^{-1}\frac{7}{25}\right] =$

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

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

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

D. none of these

Answer: D



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

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

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

C. $\cos^{-1} \frac{4}{5}$

D. π

Answer: A



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33. If $\alpha = \sin^{-1} \frac{4}{5} + \sin^{-1} \frac{1}{3}$ and $\beta = \cos^{-1} \frac{4}{5} + \cos^{-1} \frac{1}{3}$, then

A. $\alpha < \beta$

B. $\alpha = \beta$

C. $\alpha > \beta$

D. None of these

Answer: A

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34. If $\cos^{-1} \frac{p}{a} + \cos^{-1} \frac{q}{b} = \alpha$ then $\frac{p^2}{a^2} - \frac{2pq}{ab} \cos \alpha + \frac{q^2}{b^2} =$

A. $\cos^2 \alpha$

B. $\sin^2 \alpha$

C. $\tan^2 \alpha$

D. none

Answer: B

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35.

If

$\cos^{-1} x/2 + \cos^{-1} y/3 = \theta$, prove that $9x^2 - 12xy \cos \theta + 4y^2 = 36 \sin^2 \theta$

A. $36 \sin^2 \theta$

B. $36 \cos^2 \theta$

C. $36 \tan^2 \theta$

D. none

Answer: A



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36. If $\cos^{-1} x - \cos^{-1} \frac{y}{2} = \alpha$, then $4x^2 - 4xy \cos \alpha + y^2$ is equal to

A. $4 \sin^2 \alpha$

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

C. $2 \sin 2\alpha$

D. 4

Answer: A



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37. 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 $(0 < x < 2\pi)$

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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38. If $f(x) = \tan^{-1} \sqrt{\frac{1 + \sin x}{1 - \sin x}}$, $0 \leq x \leq \frac{\pi}{2}$ then $f' \left(\frac{\pi}{6} \right) = ?$

A. $1/2$

B. $-1/2$

C. 1

D. -1

Answer: B



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39. If $x \geq 1$, then $2 \tan^{-1} x + \sin^{-1} \left(\frac{2x}{1+x^2} \right) = \dots$

A. $4 \tan^{-1} x$

B. 0

C. $\pi/2$

D. π

Answer: A



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40. Evaluate : $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$.

A. 0

B. 1

C. π

D. $-\pi$

Answer: C



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41. The value of $\sin^{-1} \left\{ \cot \left(\sin^{-1} \sqrt{\left(\frac{2 - \sqrt{3}}{4} \right)} + \frac{\cos^{-1}(\sqrt{12})}{4} \frac{a}{b} + \sec^{-1} \sqrt{2} \right) \right\} =$

A. 0

B. $\pi/4$

C. $\pi/6$

D. $\pi/2$

Answer: A



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42. The number of real solutions of

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

is

A. zero

B. one

C. two

D. infinite

Answer: C



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43.

$$\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) + \dots + \tan^{-1}\left(\frac{1}{1+n+n^2}\right) +$$

is equal to (A) $\frac{2\pi}{3}$ (B) 0 (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{4}$

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

B. 0

C. $\pi/2$

D. $\pi/4$

Answer: D



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44. $\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{2}{9} + \tan^{-1} \frac{4}{33} + \dots \infty$ is equal to

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

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

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

D. none

Answer: A

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45. If $2 \tan^{-1}(\cos \theta) = \tan^{-1}(2 \cos ec\theta)$, then $\theta =$

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

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

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

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

Answer: B

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46. The number of solutions of $\sin^{-1} x + \sin^{-1} 2x = \frac{\pi}{3}$ is

- A. 0
- B. 1
- C. 2
- D. infinite

Answer: B

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Problem Set 2 True And False

1. $\tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9} = \frac{1}{2} \cos^{-1} \frac{3}{5}$

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$$2. \cos^{-1}\left(\frac{12}{13}\right) + 2\cos^{-1}\sqrt{\left(\frac{64}{65}\right)} + \cos^{-1}\sqrt{\left(\frac{49}{50}\right)} = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right).$$

True or False?



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Problem Set 2 Fill In The Blanks

$$1. \sin\{\cot^{-1}[\cos(\tan^{-1} x)]\} = \dots$$



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$$2. \cos(2\cos^{-1}x + \sin^{-1}x) \text{ at } x = \frac{1}{5} \text{ is equal to..... Where } 0 \leq \cos^{-1}x \leq \pi \text{ and } -\frac{\pi}{2} \leq \sin^{-1}x \leq \frac{\pi}{2}$$



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Problem Set 3 Multiple Choice Questions

1. If $\sin^{-1} x + \sin^{-1}(1 - x) = \cos^{-1} x$, then x belongs to

A. 1, - 1

B. 1, 0

C. 0, 1/2

D. none

Answer: C

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

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3. If: $\sin\left(\frac{\sin^{-1} 1}{5} + \cos^{-1} x\right) = 1$, then: $x =$

A. 1

B. 0

C. $\frac{4}{5}$

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

Answer: D



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4. If $\tan^{-1} \frac{x-1}{x-2} + \tan^{-1} \frac{x+1}{x+2} = \frac{\pi}{4}$, then $x =$

A. ± 1

B. ± 2

C. $\pm \sqrt{3}$

D. $\pm \frac{1}{\sqrt{2}}$

Answer: D



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5. If $\tan^{-1} \frac{x-1}{x+1} + \tan^{-1} \frac{2x-1}{2x+1} = \tan^{-1} \frac{23}{36}$, then $x =$

A. $4/3$

B. $-3/8$

C. $2/7$

D. $1/6$

Answer: A:B



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6.

If

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

then x is equal to $\frac{1}{\sqrt{3}}$ (b) $-\frac{1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) $-\frac{\sqrt{3}}{4}$

A. $\sqrt{3}$

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

C. 1

D. -1

Answer: B



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7. If $\cos^{-1} \frac{3}{5} - \sin^{-1} \frac{4}{5} = \cos^{-1} x$, then $x =$

A. 0

B. 1

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

D. $\frac{1}{4}$

Answer: B



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8. If $\sin^{-1} \frac{3}{5} + \sin^{-1} \frac{5}{13} = \sin^{-1} x$, then $x =$

A. $\frac{41}{56}$

B. $\frac{56}{65}$

C. $\frac{13}{41}$

D. none

Answer: B



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9. If $\cot^{-1} x + \sin^{-1} \frac{1}{\sqrt{5}} = \frac{\pi}{4}$, then $x =$

A. 1

B. 2

C. 3

D. 4

Answer: C



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10. If $\tan^{-1} x + \tan^{-1} \frac{1}{2} = \frac{\pi}{4}$, then $x =$

A. -3

B. 3

C. 2

D. $1/3$

Answer: D



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11. $\tan^{-1} 2x + \tan^{-1} 3x = n\pi + \frac{3\pi}{4}$, then $x =$

A. $1, -\frac{1}{6}$

B. $\frac{1}{2}, \frac{1}{3}$

C. $4, 5$

D. none

Answer: A



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12. $\sec^{-1} \frac{x}{a} - \sec^{-1} \frac{x}{b} = \sec^{-1} b - \sec^{-1} a$, then $x =$

A. a

B. b

C. ab

D. 1

Answer: C



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13. If $\tan^{-1} \left(\frac{a}{x} \right) + \tan^{-1} \left(\frac{b}{x} \right) = \frac{\pi}{2}$, then: $x = \dots$

A. $\sqrt{\frac{a}{b}}$

B. $4\sqrt{\frac{b}{a}}$

C. \sqrt{ab}

D. $\sqrt{a+b}$

Answer: C



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14. If $\sin^{-1}\left(\frac{2a}{1+a^2}\right) - \cos^{-1}\left(\frac{1-b^2}{1+b^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, then : x

=

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

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

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

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

Answer: D



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15. If $\sin^{-1} \frac{x}{5} + \operatorname{cosec}^{-1} \frac{5}{4} = \frac{\pi}{2}$ then $x =$

A. 4

B. 5

C. 1

D. 3

Answer: D



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16. If $\cos(2 \sin^{-1} x) = \frac{1}{9}$, then $x =$

A. $2/3$

B. $-2/3$

C. $1/3$

D. $-1/3$

Answer: A:B



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17. A solution of the equation

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

A. $x = 1$

B. $x = -1$

C. $x = 0$

D. $x = \pi$

Answer: C



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18.

If

$$\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} \dots \infty\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \dots \infty\right) = \frac{\pi}{2}$$

there $0 < 1 \times 1 < \sqrt{2}$, then x equals

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

B. 1

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

D. -1

Answer: B



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19. If $\cos^{-1} x > \sin^{-1} x$, then

A. $0 \leq x < \frac{1}{\sqrt{2}}$

B. $-1 < x < 0$

C. $x < 0$

D. $-1 \leq x < \frac{1}{\sqrt{2}}$

Answer: D

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20.

If

$$x^2 + y^2 + z^2 = r^2, \text{ then } \tan^{-1} \frac{xy}{zr} + \tan^{-1} \frac{yz}{xr} + \tan^{-1} \frac{zx}{yr} =$$

A. π

B. $\pi/2$

C. 0

D. none of these

Answer: B

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

A. π

B. $\pi/2$

C. 1

D. none of these

Answer: D



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

A. π

B. $\pi/2$

C. 1

D. none of these

Answer: B



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

A. -1

B. 1

C. 0

D. none of these

Answer: A



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25. The value of

$$\tan^2(\sec^{-1} 2) + \cot^2(\operatorname{cosec}^{-1} 3) \text{ is}$$

A. 11

B. 13

C. 15

D. none

Answer: A



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

A. -1

B. 0

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

D. 1

Answer: C



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27. Find the set of values of parameter a so that the equation

$$(\sin^{-1} x)^3 + (\cos^{-1} x)^3 = a\pi^3 \text{ has a solution.}$$

A. $k > \frac{1}{32}$

B. $k = \frac{1}{32}$

C. $k < \frac{1}{32}$

D. $k = 1$

Answer: C



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

A. $\frac{3}{10}$

B. $\frac{\tan^{-1} 3}{10}$

C. $\frac{\tan^{-1} 13}{10}$

D. $\frac{\tan^{-1} 1}{8}$

Answer: B



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

A. 0

B. 1

C. 2

D. 3

Answer: A



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30. $\frac{a^3}{2} \cos ec^2 \left(\frac{1}{2} \tan^{-1} \frac{a}{b} \right) + \frac{b^3}{2} \sec^2 \left(\frac{1}{2} \tan^{-1} \frac{b}{a} \right)$ is equal to

A. $(a - b)(a^2 + b^2)$

B. $(a + b)(a^2 - b^2)$

C. $(a + b)(a^2 + b^2)$

D. none of these

Answer: C

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31. The number of the + ive integral solutions of

$$\tan^{-1} x + \cos^{-1} \frac{y}{\sqrt{1+y^2}} = \sin^{-1} \left(\frac{3}{\sqrt{10}} \right)$$

or $\tan^{-1} x + \cot^{-1} y = \tan^{-1} 3$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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32. If x_1, x_2, x_3, x_4 are roots of equation $x^4 - x^3 \sin 2\beta + x^2 \cos 2\beta - x \cos \beta - \sin \beta = 0$, then $\sum_{i=1}^4 \tan^{-1} x_i =$

A. β

B. $\pi/2 - \beta$

C. $\pi - \beta$

D. $-\beta$

Answer: B



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33. $\lim_{n \rightarrow \infty} \sum_{r=1}^n \tan^{-1} \left(\frac{1}{2r^2} \right)$ is equal to

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

B. $\frac{\pi^2}{4}$

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

D. $\frac{\pi^2}{16}$

Answer: A



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34. If $c_i > 0$ for $i = 1, 2, \dots, n$, prove that

$$\tan^{-1}\left(\frac{c_1x - y}{c_1y + x}\right) + \tan^{-1}\left(\frac{c_2 - c_1}{1 + c_2c_1}\right) + \tan^{-1}\left(\frac{c_3 - c_2}{1 + c_3c_2}\right) + \dots + \frac{\tan^{-1} c_n}{c_n}$$

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

B. $\tan^{-1} xy$

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

D. none

Answer: C



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35. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$ and $\cos^{-1} x - \cos^{-1} y = \frac{\pi}{3}$, then $(x, y) =$

A. $(1, 1)$

B. $\left(\frac{1}{2}, 1\right)$

C. $\left(1, \frac{1}{2}\right)$

D. $\left(\frac{1}{3}, \frac{1}{3}\right)$

Answer: B



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36. If $\tan^{-1} \frac{1}{4} + 2 \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{6} + \tan^{-1} \frac{1}{x} = \frac{\pi}{4}$, then $x =$

A. $-\frac{321}{9}$

B. $\frac{237}{4}$

C. $-\frac{461}{9}$

D. $\frac{349}{7}$

Answer: C



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Problem Set 3 True And False

1. If $\frac{\tan^{-1}(a)}{x} + \frac{\tan^{-1}(b)}{x} + \frac{\tan^{-1}(c)}{x} + \tan^{-1}(d)/(x) = \frac{\pi}{2}$

then $x^4 - x^2(\Sigma ab) + abcd =$



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2. $\sin^{-1} \sqrt{2-x} = \cos^{-1} \sqrt{x-1}$ holds for all real x. True or False



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3. $\cos^{-1} \left[\frac{2+3\cos x}{3+2\cos x} \right] = 2 \tan^{-1} \left[\frac{1}{\sqrt{5}} \tan \frac{x}{2} \right]$ Is this statement true or

false?



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Problem Set 3 Fill In The Blanks

1. If $\tan^{-1}\left(x + \frac{2}{x}\right) - \tan^{-1}\frac{4}{x} - \tan^{-1}\left(x - \frac{2}{x}\right) = 0$, then $x =$

.....

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2. If $\sin\left[2\cos^{-1}\left\{\cot\left(2\tan^{-1}x\right)\right\}\right] = 0$, $x > 0$ then $x =$

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3. If $\sin^{-1}\frac{3x}{5} + \sin^{-1}\frac{4x}{5} = \sin^{-1}x$, then $x =$

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4. If $\tan^{-1}\frac{1}{a-b} = \tan^{-1}\frac{1}{x} + \tan^{-1}\frac{1}{a^2-x+1}$, then $x =$

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Problem Set 4 Multiple Choice Questions

1. Prove that $\tan\left[\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right] + \tan\left[\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right] = 2\frac{b}{a}$

A. $\frac{a}{2b}$

B. $\frac{b}{2a}$

C. $\frac{2b}{a}$

D. $\frac{2a}{b}$

Answer: C



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

A. $\cos x$

B. $\frac{\pi}{4} - \left(\frac{1}{2}\right)\cos^{-1}(x^2)$

C. $\tan x$

D. none

Answer: B



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

A. $x > y$ and $y^2 = 1 - x$

B. $x > y$

C. $x > y$ and $y^2 = x$

D. $y^2 = 1 + x$

Answer: A



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4. If $A = 2 \tan^{-1}(2\sqrt{2} - 1)$ and $B = 3 \sin^{-1}\left(\frac{1}{3}\right) + \sin^{-1}\left(\frac{3}{5}\right)$, then

A. $A > B$

B. $A < B$

C. $A = B$

D. none

Answer: A

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Problem Set 4 True And False

1. The value of $\tan \left[\frac{1}{2} \cos^{-1} \cdot \frac{\sqrt{5}}{3} \right]$ is

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2.

If

$$\frac{m \tan(\alpha - \theta)}{\cos^2 \theta} = \frac{n \tan \theta}{\cos^2(\alpha - \theta)}, \text{ then } \theta = \frac{1}{2} \left[\alpha - \tan^{-1} \left\{ \frac{n - m}{n + m} \tan \alpha \right\} \right]$$

. True or False?

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$$3. 2 \tan^{-1} \left\{ \frac{\tan \alpha}{2} \left(\frac{\pi}{4} - \frac{\beta}{2} \right) \right\} = \tan^{-1} \frac{\cos \alpha \sin \beta}{\sin \alpha + \cos \beta}. \text{ True or False?}$$

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$$4. \text{ Prove that } 2 \tan^{-1} \left(\sqrt{\frac{a-b}{a+b}} \frac{\tan \theta}{2} \right) = \cos^{-1} \left(\frac{a \cos \theta + b}{a + b \cos \theta} \right)$$

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$$5. \tan^{-1} \frac{2mn}{m^2 - n^2} + \tan^{-1} \frac{2pq}{p^2 - q^2} = \tan^{-1} \frac{2MN}{M^2 - N^2}$$

where $M = mp - nq$, $N = np + mq$

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Problem Set 4 Fill In The Blanks

1. $\cot^{-1}\left(2^2 + \frac{1}{2}\right) + \cot^{-1}\left(2^3 + \frac{1}{2^2}\right) + \cot^{-1}\left(2^4 + \frac{1}{2^3}\right) + \dots \dots \infty$

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Self Assessment Test

1. If $\cos^{-1} \frac{1}{x} = \theta$, then $\tan \theta =$

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

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

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

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

Answer: B



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

A. $2x / (1 - x^2)$

B. $2x / (x^2 - 1)$

C. $2x / (1 + x^2)$

D. none of these

Answer: C



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3. Write the value of $\sin(\cot^{-1} x)$.

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

B. x

C. $(1 + x^2)^{-3/2}$

D. $(1 + x^2)^{-1/2}$

Answer: D



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4. The value of

$$\cos^{-1} \left\{ \frac{\sqrt{1 - \sin x} + \sqrt{1 + \sin x}}{\sqrt{1 - \sin x} - \sqrt{1 + \sin x}} \right\} \text{ is } \left(0 < x < \frac{\pi}{2} \right)$$

A. $\pi - x$

B. $2\pi - x$

C. $x/2$

D. $\pi - \frac{1}{2}x$

Answer: D



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5. The value of $\sin^{-1} x + \cos^{-1} x$ ($|x| \leq 1$) is

A. 1

B. π

C. $\pi/2$

D. $-\pi/2$

Answer: C



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6. If $\sin\left(\frac{\sin^{-1} 1}{5} + \cos^{-1} x\right) = 1$ then x is equal to

A. 1

B. 0

C. $\frac{4}{5}$

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

Answer: D



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7. The value of $\cos^{-1}(-1) - \sin^{-1}(1)$ is- π b. $\frac{\pi}{2}$ c. $\frac{3\pi}{2}$ d. $-\frac{3\pi}{2}$

A. π

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

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

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

Answer: B



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8. 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 $2 \frac{\sec^{-1} x}{2} + \frac{\sin^{-1} x}{2} =$

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

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

C. $3\pi/2$

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

Answer: C



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9. $\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{2}{9} + \tan^{-1} \frac{4}{33} + \dots \infty$ is equal to

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

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

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

D. none

Answer: A



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10. Find the set of values of parameter a so that the equation $(\sin^{-1} x)^3 + (\cos^{-1} x)^3 = a\pi^3$ has a solution.

A. $k > \frac{1}{32}$

B. $k = \frac{1}{32}$

C. $k < \frac{1}{32}$

D. $k = 1$

Answer: A



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11. If $\sin\left(\frac{\sin^{-1} 1}{5} + \cos^{-1} x\right) = 1$ then x is equal to

A. $\frac{4}{5}$

B. 1

C. 0

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

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. $\frac{24}{25}$

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

D. $\frac{7}{24}$

Answer: D



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13. 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. none of these

Answer: B

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14. $\cot^{-1} 9 + \frac{\cos^{-1} \sqrt{41}}{4} =$

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

B. 0

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

D. none of these

Answer: C

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15. The principal value of $\sin^{-1}\left(\sin\frac{5\pi}{3}\right)$ is

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

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

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

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

Answer: C



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16. 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. $\{1, 2, 0\}$

Answer: C



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17. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{\pi}{2}$, then the value of $x^2 + y^2 + z^2 + 2xyz$ is equal to

A. 2

B. 1

C. 0

D. 3

Answer: B



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18. $\cos\left(\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{2}\right)\right) =$

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

B. $\sqrt{2}$

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

D. none of these

Answer: A



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19. $\sin^{-1} \frac{1}{\sqrt{5}} + \cot^{-1} 3$ is equal to

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

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

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

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

Answer: B



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20. If $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \sin^{-1}\left(\frac{2b}{1+b^2}\right) = 2 \tan^{-1} x$, then x is equal to $[a, b, \in (0, 1)]$ (a) $\frac{a-b}{1+ab}$ (b) $\frac{b}{1+ab}$ (c) $\frac{b}{1-ab}$ (d) $\frac{a+b}{1-ab}$

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

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

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

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

Answer: D



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21. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$

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

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

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

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

Answer: B

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22. $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{3} =$

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

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

C. 0

D. π

Answer: B

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23. If $\cos^{-1} \sqrt{p} + \cos^{-1} \sqrt{1-p} + \cos^{-1} \sqrt{1-q} = \frac{3\pi}{4}$ then $q =$

A. 1

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

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

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

Answer: D



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24. If $0 < x \leq 1$, then

$$\sqrt{1+x^2} \left[\{x \cos(\cot^{-1} x) + \sin(\cot^{-1} x)\}^2 - 1 \right]^{1/2} =$$

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

B. x

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

D. none of these

Answer: C



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

A. 0

B. 1

C. 2

D. infinite

Answer: C



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