MATHS

BOOKS - CENGAGE PUBLICATION

INVERSE TRIGONOMETRIC FUNCTIONS

solved examples

1. Solve $2\cos^{-1}x = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$

Watch Video Solution

2. Find the domain for $f(x) = \sin^{-1}\left(\frac{1+x^2}{2x}\right)$

Watch Video Solution

3. Find the range of $\cot^{-1}(2x - x^2)$

Watch Video Solution

4. 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.

Watch Video Solution

5. Solve the equation $\sqrt{|\sin^{-1}|\cos x|| + |\cos^{-1}|\sin x||} = \sin^{-1}|\cos x| - \cos^{-1}|\sin x|, \frac{-\pi}{2} \leq x \leq$

Watch Video Solution

6. If $p > q > 0$ and $pr < -1 < qr$, then find the value of $\tan^{-1}\left(\frac{p-q}{1+pq}\right) + \tan^{-1}\left(\frac{q-r}{1+qr}\right) + \tan^{-1}\left(\frac{r-p}{1+rp}\right)$

Watch Video Solution

7. Prove that:

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

$$\ldots\ldots.+\tan^{-1}\left(\frac{c_n-c_{n-1}}{1+c_nc_{n-1}}\right)+\tan^{-1}\left(\frac{1}{c_n}\right)=\tan^{-1}\left(\frac{x}{y}\right)$$

Watch Video Solution

8. Find the number of positive integral solution of the equation

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

Watch Video Solution

9. If $\tan^{-1}y=4\tan^{-1}x$ then prove that $x^4-6x^2+1=0$ when 1/y = 0 and find the roots of x.

Watch Video Solution

10. Find the sum

$\cos ec^{-1}\sqrt{10}+\cos ec^{-1}\sqrt{50}+\cos ec^{-1}\sqrt{170}++\cos ec^{-1}\sqrt{(n^2+1)(n^2$

Watch Video Solution

11. Let $f(x)=\sin x+\cos x+\tan x+\sin^{-1}x+\cos^{-1}x+\tan^{-1}x.$

Then find the maximum and minimum values of $f(x).$

Watch Video Solution

Illustration

1. Find the principal value of the following:

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

Watch Video Solution

2. Solve $\sin^{-1} x > -1$

Watch Video Solution

3. Solve $\cos^{-1} x > \cos^{-1} x^2$

Watch Video Solution

4. Solve for x if $\left(\cot^{-1} x\right)^2 - 3\left(\cot^{-1} x\right) + 2 > 0$

Watch Video Solution

5. Find the value of x for which the following expression are defined

$\sin^{-1}(3x - 2)$

Watch Video Solution

6. 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

Watch Video Solution

7. Find the value of

(i) $\sin^{-1}(2^x)$

(ii) $\cos^{-1}\sqrt{x^2-x+1}$

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

(iv) $\sec^{-1}\left(x+\frac{1}{x}\right)$

Watch Video Solution

8. Find the range of $f(x)=\left|3\tan^{-1}x-\cos^{-1}(0)\right|-\cos^{-1}(-1)\cdot$

Watch Video Solution

9. Find the value of x for which $\sec^{-1} x \sin^{-1} x = \frac{\pi}{2}$.

Watch Video Solution

10. If $\sin^{-1}(x^2 + 2x + 2) + \tan^{-1}(x^2 - 3x - k^2) > \frac{\pi}{2}$, then find the values of k.

Watch Video Solution

11. If $\cos^{-1} \lambda + \cos^{-1} \mu + \cos^{-1} \gamma = 3\pi$, then find the value of $\lambda\mu + \mu\lambda$.

Watch Video Solution

12. If $\sin^{-1} x_1 + \sin^{-1} x_2 + \ + \sin^{-1} x_n \leq \ = \frac{n\pi}{2}, n \in N, n = 2m + 1, m \geq 1,$

then find the value of $\frac{x1^1 + x3^3 + x5^5 + \dots + (m+1)terms}{x2^2 + x4^4 + x6^6 + \dots + mterms}$

Watch Video Solution

Watch Video Solution

13. Find x satisfying $[\tan^{-1} x] + [\cot^{-1} x] = 2,$ where $[]$ represents the greatest integer function.

Watch Video Solution

14. If $\cos(2\sin^{-1} x) = \frac{1}{9},$ then find the values of x.

Watch Video Solution

15. Find the value of $\sin\left(\frac{1}{2}\cot^{-1}\left(-\frac{3}{4}\right)\right)$

Watch Video Solution

16. Prove that: $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right) = \frac{x}{2}, x \in \left(0, \frac{\pi}{4}\right)$

Watch Video Solution

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

Watch Video Solution

18. Find the number of solution of the equation $\cos\left(\cos^{-1} x\right) = \cos ec\left(\cos ec^{-1} x\right)$.

Watch Video Solution

19. Find the principal values of the following

(i) $\sin^{-1}(\sin 1)$ (ii) $\sin^{-1}(\sin 2)$

(iii) $\sin^{-1}(\sin 10)$

Watch Video Solution

20. Solve $\sin^{-1}(\sin 6x) = x, x \in [0, \pi]$

Watch Video Solution

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

Watch Video Solution

22. Find the area bounded by $y = \sin^{-1}(\sin x)$ and x-axis for x in $[0, 100\pi]$

Watch Video Solution

23. Find the value of x for which $f(x) = 2\sin^{-1}\sqrt{1-x} + \sin^{-1}\left(2\sqrt{x-x^2}\right)$ is constant

Watch Video Solution

24. Find the principal value of the following

$$\cos^{-1}\left(\cos\left(\frac{48\pi}{7}\right)\right)$$

Watch Video Solution

25. Solve $\cos^{-1}(\cos x) > \sin^{-1}(\sin x), x \in [0, 2\pi]$

Watch Video Solution

26. Find the principal values of the following

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

Watch Video Solution

27. Find the number of solution of $2\tan^{-1}(\tan x) = 6 - x$

Watch Video Solution

28. Write $\tan^{-1} x, x > 0$ in the form of other inverse trigonometric function

Watch Video Solution

29. Find $\tan^{-1}.\ \frac{x}{\sqrt{a^2-x^2}}$ in terms of $\sin^{-1}$, where $x \in (0, a)$

Watch Video Solution

30. Show that $\sin\left(\cot^{-1}\left(\tan\cos^{-1}x\right)\right) = x$

Watch Video Solution

31. If $x < 0$, then prove that $\cos^{-1}x = \pi - \sin^{-1}\sqrt{1-x^2}$

Watch Video Solution

32. Prove that $\cos^{-1}\left\{\sqrt{\frac{1+x}{2}}\right\} = \frac{\cos^{-1}x}{2},\ -1 < x < 1$

Watch Video Solution

33. Prove that $\tan^{-1}\left\{\frac{x}{a+\sqrt{a^2-x^2}}\right\}=\frac{1}{2}\sin^{-1}\left(\frac{x}{a}\right),\ -a<x<a$

Watch Video Solution

34. Prove that: $\sin^{-1}\left\{\frac{\sqrt{1+x}+\sqrt{1-x}}{2}\right\}=\frac{\pi}{4}+\frac{\cos^{-1}x}{2}, 0<x<1$

Watch Video Solution

35. Prove that $\cos^{-1}\left(\frac{1-x^{2n}}{1+x^{2n}}\right)=2\tan^{-1}x^n, 0<xl<\infty$

Watch Video Solution

36. If $x\in[-1,0]$, then find the value of $\cos^{-1}(2x^2-1)-2\sin^{-1}x$

Watch Video Solution

37. If $\frac{1}{\sqrt{2}} < x < 1,$ then prove that $\cos^{-1}x + \cos^{-1}\left(\frac{x+\sqrt{1-x^2}}{2}\right) = \frac{\pi}{4}$

Watch Video Solution

38. Find the value of $\sin^{-1}(\sin 5) + \cos^{-1}(\cos 10) + \tan^{-1}\{\tan(-6)\} + \cot^{-1}\{\cot(-10)\}$

Watch Video Solution

39. Find the minimum value of the function $f(x) = \frac{\pi^2}{16\cot^{-1}(-x)} - \cot^{-1}x$

Watch Video Solution

40. Find the range of $y = (\cot^{-1}x)(\cot^{-1}(-x))$.

Watch Video Solution

41. The value of $2\tan^{-1}(\cos ec \tan^{-1}x - \tan\cot^{-1}x)$ is equal to $\cot^{-1}x$ (b) $\frac{\cot^{-1}1}{x}$ $\tan^{-1}x$ (d) none of these

Watch Video Solution

42. Prove that $\cos\tan^{-1}\sin\cot^{-1}x = \sqrt{\frac{x^2+1}{x^2+2}}$

Watch Video Solution

43. If $\sin^{-1}x = \frac{\pi}{5}$, for some $x \in (-1, 1)$, then find the value of $\cos^{-1}x$

Watch Video Solution

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

Watch Video Solution

Watch Video Solution

45. Solve $\sin^{-1} x \leq \cos^{-1} x.$

Watch Video Solution

46. Find the range of $f(x) = \sin^{-1} x + \tan^{-1} x + \cos^{-1} x.$

Watch Video Solution

47. Find the minimum value of $\left(\sec^{-1} x\right)^2 + \left(\mathrm{c\,o\,s\,e\,c}^{-1}\right)^2$

Watch Video Solution

48. Find the range of $f(x) = \left(\sin^{-1} x\right)^2 + 2\pi \cos^{-1} x + \pi^2$

Watch Video Solution

49. Solve $\sin^{-1}\left(\frac{14}{|x|}\right)+\sin^{-1}\left(\frac{2\sqrt{15}}{|x|}\right)=\frac{\pi}{2}$

Watch Video Solution

50. If $\alpha=\sin^{-1}(\cos(\sin^{-1}x)) and \beta=\cos^{-1}(\sin(\cos^{-1}x))$, then find $\tan\alpha\dot{\tan}\beta$

Watch Video Solution

51. Is $\sec^{-1}x=\cos ec^{-1}y$, then the value of $\cos^{-1}\left(\frac{1}{x}\right)+\cos^{-1}\left(\frac{1}{y}\right)$ will be

A. π

B. π/4

C. π/2

D. -π/2

Watch Video Solution

52. Prove that $\tan^{-1}x+\tan^{-1}.\frac{1}{x}=\begin{cases}\pi/2 & \text{if} x>0\\ -\pi/2 & \text{if } x<0\end{cases}$

Watch Video Solution

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

Watch Video Solution

54. Find the value of $\sum_{r=1}^{10}\sum_{s=1}^{10}\tan^{-1}\left(\frac{r}{s}\right).$

Watch Video Solution

55. If $\sin^{-1}x_i\in[0,1]\,\forall i=1,2,3,.28$ then find the maximum value of $\sqrt{\sin^{-1}x_1}\sqrt{\cos^{-1}x_2}+\sqrt{\sin^{-1}x_2}\sqrt{\cos^{-1}x_3}+\sqrt{\sin^{-1}x_3}\sqrt{\cos^{-1}x_4}++\sqrt{\sin^{-1}x_{28}}\sqrt{\cos^{-1}x_1}$

Watch Video Solution

56. If two angles of a triangle are $\tan^{-1}(2)$ and $\tan^{-1}(3)$, then find the third angles

Watch Video Solution

57. Prove that $\cos^{-1}.\frac{4}{5} + \cos^{-1}.\frac{12}{13} = \cos^{-1}.\frac{33}{65}$

Watch Video Solution

58. Prove that:

$$\tan^{-1}\left(\frac{1}{2}\tan 2A\right) + \tan^{-1}(\cot A) + \tan^{-1}\left(\cot^3 A\right) = 0$$

Watch Video Solution

59. Let a, b and c be positive real numbers. Then prove that

$$\tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}}+\tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}}+\tan^{-1}\sqrt{\frac{c(a+b+c)}{ab}}=$$

Watch Video Solution

60. Simplify

$$\tan^{-1}\left[\frac{3\sin 2\alpha}{5+3\cos 2\alpha}\right]+\tan^{-1}\left[\frac{\tan\alpha}{4}\right],\quad \text{where}\quad -\frac{\pi}{2}<\alpha<\frac{\pi}{2}$$

Watch Video Solution

61. Solve the equation $\tan^{-1}2x+\tan^{-1}3x=\frac{\pi}{4}$

Watch Video Solution

62. Solve $\tan^{-1}x+\sin^{-1}x=\tan^{-1}2x.$

Watch Video Solution

63. Solve $\cot^{-1}\left(\frac{3x^2+1}{x}\right)=\cot^{-1}\left(\frac{1-3x^2}{x}\right)-\tan^{-1}6x$

Watch Video Solution

64. If $x>y>z>0,$ then find the value of $\cot^{-1}\left(\frac{xy+1}{x-y}\right)+\cot^{-1}\left(\frac{yz+1}{zy-z}\right)+\cot^{-1}\left(\frac{zx+1}{z-x}\right)$

Watch Video Solution

65. Solve $\tan^{-1}x+\cot^{-1}(-|x|)=2\tan^{-1}6x$

Watch Video Solution

66. If $a_1, a_2, a_3, , a_n$ is an A.P. with common difference $d,$ then prove that $\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{d}{1+a_2a_3}\right)+\ldots\ldots+\tan^{-1}\left(\frac{d}{1+a_{n-1}a\right.\right.$

Watch Video Solution

67. Find the value of $\sum_{r=0}^{\infty} \tan^{-1}\left(\frac{1}{1+r+r^2}\right)$

Watch Video Solution

68. Find the sum $\sum_{r=1}^{\infty} \tan^{-1}\left(\frac{2(2r-1)}{4+r^2(r^2-2r+1)}\right)$

Watch Video Solution

69. Find the value of $4\tan^{-1}\left(\frac{1}{5}\right) - \tan^{-1}\left(\frac{1}{70}\right) + \tan^{-1}\left(\frac{1}{99}\right)$

Watch Video Solution

70. If $(x-1)(x^2+1) > 0$, then find the value of $\sin\left(\frac{1}{2}\tan^{-1}\left(\frac{2x}{1-x^2}\right) - \tan^{-1}x\right)$

Watch Video Solution

71. Prove that

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

Watch Video Solution

72. Prove that $\cot^{-1}.\ \frac{3}{4} + \sin^{-1}.\ \frac{5}{13} = \sin^{-1}.\ \frac{63}{65}$

Watch Video Solution

73. Solve $\sin^{-1}x + \sin^{-1}2x = \frac{\pi}{3}.$

Watch Video Solution

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

Watch Video Solution

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

for what values of x?

Watch Video Solution

76. If $x\in\left(0,\frac{\pi}{2}\right)$, then show that $\cos^{-1}\left(\frac{7}{2}(1+\cos 2x)+\sqrt{(\sin^2 x-48\cos^2 x)}\sin x\right)=x-\cos^{-1}(7\cos x$

Watch Video Solution

77. Which of the following angles is greater? $\theta_1=\sin^{-1}+\frac{\sin^{-1}1}{3}$ or $\theta_2=\frac{\cos^{-1}4}{5}+\frac{\cos^{-1}1}{3}$

Watch Video Solution

78. Find the value $(\lim)_{n\to\infty}\sum_{k=2}^{n}\left(\frac{1+\sqrt{(k-1)k(k+1)(k+2)}}{k(k+1)}\right)$

Watch Video Solution

79. If $f(x) = \sin^{-1} x$ then prove that

$$\lim_{x \to \frac{1}{2}^+} f(3x - 4x^3) = \pi - 3 \lim_{x \to \frac{1}{2}^+} \sin^{-1} x$$

Watch Video Solution

80. Solve $\sin^{-1} x - \cos^{-1} x = \sin^{-1}(3x - 2)$

Watch Video Solution

81. If

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

.

Watch Video Solution

82. Prove that $\sin^{-1}\left(\frac{2x}{1+x^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$

Watch Video Solution

83. If $\sin^{-1}\left(\frac{4x}{x^2+4}\right) + 2\tan^{-1}\left(-\frac{x}{2}\right)$ is independent of x, find the values of x

Watch Video Solution

84. If $\cos^{-1}\left(\frac{6x}{1+9x^2}\right) = -\frac{\pi}{2} + 2\tan^{-1}3x$, then find the value of x.

Watch Video Solution

85. Find the value of $2\cos^{-1}\left(\frac{3}{\sqrt{13}}\right) + \cot^{-1}\left(\frac{16}{63}\right) + \frac{1}{2}\cos^{-1}\left(\frac{7}{25}\right)$

Watch Video Solution

Concept application exercise 7.1

1. Find the principal value of (a) $\cos ec^{-1}(-1)$ (b) $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

Watch Video Solution

2. Solves $\cos^{-1} x < 2$

A. $x \in (\cos 2, 2)$

B. $x \in (0, 1)$

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

D. $x \in (\cos 2, 1)$

Answer: D

Watch Video Solution

3. Find the possible values of $\sin^{-1}(1-x)+\cos^{-1}\sqrt{x-2}$

A. 0

B. `{-1,1}

C. 2

D. -1/2

Answer: A

Watch Video Solution

4. Find the real values of x for which the function $f(x)=\cos^{-1}\sqrt{x^2+3x+1}+\cos^{-1}\sqrt{x^2+3x}$ is defined

Watch Video Solution

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

Watch Video Solution

6. Find the value of x for which $\sin^{-1}(\cos^{-1} x) < 1$ and $\cos^{-1}(\cos^{-1} x) < 1$

Watch Video Solution

7. Solve $\sin^{-1} x > \tan^{-1} x$

Watch Video Solution

8. Find the range of $f(x) = \cos^{-1} x + \cot^{-1} x$

Watch Video Solution

9. If $\left(\sin^{-1}x\right)^2+\left(\sin^{-1}y\right)^2+\left(\sin^{-1}z\right)^2=\frac{3}{4}\pi^2$, find the value of $x^2+y^2+z^2$.

Watch Video Solution

10. Find the value of $\sin\left(\frac{1}{4}\right)\cos^{-1}\left(\frac{-1}{9}\right)$

Watch Video Solution

11. If $x<0$, then prove that $\cos^{-1}x=\pi-\sin^{-1}\sqrt{1-x^2}$

Watch Video Solution

12. Prove that $\sin^{-1}.\left(\frac{x+\sqrt{1-x^2}}{\sqrt{2}}\right)=\sin^{-1}x+\frac{\pi}{4}$, where $-\frac{1}{\sqrt{2}}<x<\frac{1}{\sqrt{2}}$

Watch Video Solution

Concept application exercise 7.2

1. Find the following values :

(a) $\tan^{-1}\left(\tan 13\frac{\pi}{5}\right)$ (b) $\sec^{-1}\left(\sec 13\frac{\pi}{3}\right)$

(c) $\sin^{-1}\left(\sin 33\frac{\pi}{5}\right)$ (d) $\sin^{-1}(\sin 8)$

(e) $\tan^{-1}(\tan 10)$ (f) $\sec^{-1}(\sec 9)$

(g) $\cot^{-1}(\cot 6)$ (h) $\cos ec^{-1}(\cos ec7)$

Watch Video Solution

2. If $f(x)=\sin^{-1}(\sin(\log_2 x))$, then find the value of $f(300)$

Watch Video Solution

3. find the maximum value of $f(x)=\left(\sin^{-1}(\sin x)\right)^2-\sin^{-1}(\sin x)$

Watch Video Solution

4. Solve for $\sin^{-1}(\sin 5) > x^2 - 4x$

Watch Video Solution

5. Consider function $f(x) = \sin^{-1}(\sin x) + \cos^{-1}(\cos x), x \in [0, 2\pi]$

(a) Draw the graph of $y = f(x)$

(b) Find the range of $f(x)$

(c) Find the area bounded by $y = f(x)$ and x-axis

Watch Video Solution

6. Find the values of $x \in [0, 2\pi]$ for which function $f(x) = \tan^{-1}(\tan x)$ and $g(x) = \cos^{-1}(\cos x)$ are identical

Watch Video Solution

Concept application exercise 7.3

1. Express $\sin^{-1}.\ \frac{\sqrt{x}}{\sqrt{x+a}}$ as a function of $\tan^{-1}$

Watch Video Solution

2. If $\tan(\cos^{-1}x) = \sin\left(\cot^{-1}\left(\frac{1}{2}\right)\right)$, then find the value of x

Watch Video Solution

3. Prove that: $\cos ec(\tan^{-1}(\cos(\cot^{-1}(\sec(\sin^{-1}a))))) = \sqrt{3-a^2}$, where $a \in [0, 1]$

Watch Video Solution

4. Prove that $\sin\cot^{-1}\tan\cos^{-1}x = \sin\cos ec^{-1}\cot\tan^{-1}x = x, \quad \text{where} \quad x \in [0, 1]$

Watch Video Solution

5. $\tan^{-1}\left(\frac{\sqrt{1+a^2x^2}-1}{ax}\right)$ where $x \neq 0,$ is equal to

Watch Video Solution

6. Prove that $\sin\left[2\tan^{-1}\left\{\sqrt{\frac{1-x}{1+x}}\right\}\right] = \sqrt{1-x^2}$

Watch Video Solution

7. Prove that $\tan^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right) = \frac{\pi}{2} - \sec^{-1}x, x > 1$

Watch Video Solution

8. Prove that: $\tan^{-1}\left\{\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right\} = \frac{\pi}{4} - \frac{1}{2}.\cos^{-1}x$,

$0 < x < 1$

Watch Video Solution

9. If $x < 0$, the prove that $\cos^{-1}\left(\frac{1+x}{\sqrt{2(1+x^2)}}\right) = \frac{\pi}{4} - \tan^{-1}x$

Watch Video Solution

10. Find the value of $\tan^{-1}\left(-\tan\left(\frac{13\pi}{8}\right)\right) + \cot^{-1}\left(-\cot\left(\frac{19\pi}{8}\right)\right)$

Watch Video Solution

11. The value of $\tan\left\{\left(\cos^{-1}\left(-\frac{2}{7}\right) - \frac{\pi}{2}\right)\right]$ is

Watch Video Solution

12. If $\tan^{-1}\left(\frac{1}{y}\right) = -\pi + \cot^{-1}y$, where $y = x^2 - 3x + 2$, then find the value of x

Watch Video Solution

Concept application exercise 7.4

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

Watch Video Solution

2. solve the equation $\cot^{-1}x+\tan^{-1}3=\frac{\pi}{2}$

Watch Video Solution

3. Solve $2\cos^{-1}x+\sin^{-1}x=\frac{2\pi}{3}$

Watch Video Solution

4. Prove that $\sin^{-1}\cos\left(\sin^{-1}x\right)+\cos^{-1}x=\frac{\pi}{2}, |x|\leq 1$

Watch Video Solution

5. If $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$ and $\cos^{-1}x - \cos^{-1}y = -\frac{\pi}{3}$ then the number of values of (x, y) is

Watch Video Solution

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

Watch Video Solution

7. Solve $\sec^{-1}x > \cos ec^{-1}x$

Watch Video Solution

8. Solve $\tan^{-1}x > \cot^{-1}x$

Watch Video Solution

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

Watch Video Solution

10. If $\alpha \in \left(-\frac{\pi}{2}, 0\right)$, then find the value of $\tan^{-1}(\cot\alpha) - \cot^{-1}(\tan\alpha)$

Watch Video Solution

11. Find the maximum value of $(\sec^{-1}x)(\cos ec^{-1}x), x \geq 1$

Watch Video Solution

12. If equation $\sin^{-1}(4\sin^2\theta + \sin\theta) + \cos^{-1}(6\sin\theta - 1) = \frac{\pi}{2}$ has 10 solution for $\theta \in [0, n\pi]$, then find the minimum value of n

Watch Video Solution

Concept application exercise 7.5

1. Find the value of $\sin^{-1}\left(\frac{3}{5}\right)+\tan^{-1}\left(\frac{1}{7}\right)$

Watch Video Solution

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

Watch Video Solution

3. Prove that

$$\tan^{-1}.\ \frac{1}{\sqrt{2}}+\sin^{-1}.\ \frac{1}{\sqrt{5}}-\cos^{-1}.\ \frac{1}{\sqrt{10}}=-\pi+\cot^{-1}\left(\frac{1+\sqrt{2}}{1-\sqrt{2}}\right)$$

Watch Video Solution

4. Solve : $\tan^{-1}\left(\frac{x-1}{x-2}\right)+\tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}$

Watch Video Solution

5. The number of real values of x satisfying $\tan^{-1}\left(\frac{x}{1-x^2}\right)+\tan^{-1}\left(\frac{1}{x^3}\right)=\frac{3\pi}{4}$

A. A. 0

B. B. 1

C. C. 2

D. D. Infinitely many

Answer: no solution

Watch Video Solution

6. Prove the following: $2\sin^{-1}\left(\frac{3}{5}\right)=\tan^{-1}\left(\frac{24}{7}\right)$

Watch Video Solution

7. Write the following function in the simplest form: $\tan^{-1}\left(\frac{3a^2x - x^3}{a^3 - 3ax^2}\right), a > 0; \frac{-a}{\sqrt{3}} \leq x \leq \frac{a}{\sqrt{3}}$

Watch Video Solution

8. Solve the equation $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$

Watch Video Solution

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

Watch Video Solution

10. If $x + y + z = xyz$ and $x, y, z > 0$, then find the value of $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z$

Watch Video Solution

11. If α and $\beta(\alpha > \beta)$ are the roots of $x^2 + kx - 1 = 0$, then find the value of $\tan^{-1}\alpha - \tan^{-1}\beta$

Watch Video Solution

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

Watch Video Solution

13. Prove that $\sum_{r=1}^{n} \tan^{-1}\left(\frac{2^{r-1}}{1 + 2^{2r-1}}\right) = \tan^{-1}(2^n) - \frac{\pi}{4}$

Watch Video Solution

Concept application exercise 7.6

1. If $\cos^{-1}.\frac{x}{2}+\cos^{-1}.\frac{y}{3}=\frac{\pi}{6}$, then prove that $\frac{x^2}{4}-\frac{xy}{2\sqrt{3}}+\frac{y^2}{9}=\frac{1}{4}$

Watch Video Solution

2. Prove that : $\cos^{-1}x+\cos^{-1}\left(\frac{x}{2}+\frac{\sqrt{3-3x^2}}{2}\right)=\frac{\pi}{3}$

Watch Video Solution

3. solve the following equation $\sec^{-1}.\frac{x}{a}-\sec^{-1}.\frac{x}{b}=\sec^{-1}b-\sec^{-1}a,\ a\geq 1,\ b\geq 1,\ a\neq b$

Watch Video Solution

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

Watch Video Solution

Watch Video Solution

5. If $\cos(\theta - \alpha) = a$ and $\sin(\theta - \beta) = b(0 < \theta - \alpha, \theta - \beta < \pi/2)$, then prove that $\cos^2(\alpha - \beta) + 2ab\sin(\alpha - \beta) = a^2 + b^2$

Watch Video Solution

6. prove that, $2\tan^{-1}2x = \sin^{-1}.\frac{4x}{1+4x^2}$

Watch Video Solution

7. If $x \in (0, 1)$, then find the value of $\tan^{-1}\left(\frac{1-x^2}{2x}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$

Watch Video Solution

8. If $x \in [-1, 0]$, then find the value of $\cos^{-1}(2x^2 - 1) - 2\sin^{-1}x$

Watch Video Solution

9. $\sin\left(2\sin^{-1}0.8\right) =$

Watch Video Solution

Single correct

1. $\cos^{-1}\left(\cos\left(2\cot^{-1}\left(\sqrt{2}-1\right)\right)\right)$ is equal to (a) $\sqrt{2}-1$ (b) $\frac{\pi}{4}$ (c) $\frac{3\pi}{4}$ (d) none of these

A. $\sqrt{2}-1$

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

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

D. none of these

Answer: C

Watch Video Solution

2. The value of $\sin^{-1}\left(\cot\left(\sin^{-1}\sqrt{\frac{2-\sqrt{3}}{4}}+\cos^{-1}\left(\frac{\sqrt{12}}{4}\right)+\sec^{-1}\sqrt{2}\right)\right) is$ (a)0 (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) none of these

A. 0

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

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

D. none of these

Answer: A

Watch Video Solution

3. If $\cot^{-1}\left(\frac{n}{\pi}\right) > \frac{\pi}{6}, n \in N$, then the maximum value of n is :

A. A. 6

B. B. 7

C. C. 5

D. D. none of these

Answer: C

Watch Video Solution

4. If $\cos ec^{-1}(\cos ecx)$ and $\cos ec(\cos ec^{-1}x)$ are equal functions, then the maximum range of value of x is (a)$\left[-\frac{\pi}{2}, -1\right] \cup \left[1, \frac{\pi}{2}\right]$ (b) $\left[-\frac{\pi}{2}, 0\right] \cup \left[0, \frac{\pi}{2}\right]$ (c)$(-\infty, -1) \cup [1, \infty]$ (d) $[-1, 0] \cup [0, 1]$

A. $\left[-\frac{\pi}{2}, -1\right] \cup \left[1, \frac{\pi}{2}\right]$

B. $\left[-\frac{\pi}{2}, 0\right) \cup \left[0, \frac{\pi}{2}\right]$

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

D. $[-1, 0) \cup [0, 1)$

Answer: A

Watch Video Solution

5. $\sec^2(\tan^{-1} 2) + \cos ec^2(\cot^{-1} 3)$ is equal to

A. 5

B. 13

C. 15

D. 6

Answer: C

Watch Video Solution

6. The maximum value of $f(x) = \tan^{-1}\left(\frac{(\sqrt{12} - 2)x^2}{x^4 + 2x^2 + 3}\right)$ is (A) 18° (B) 36° (C) 22.5° (D) 15°

A. 18°

B. 36°

C. 22.5°

D. 15°

Answer: D

Watch Video Solution

7. For the equation $\cos^{-1}x + \cos^{-1}2x + \pi = 0$, the number of real solution is 1 (b) 2 (c) 0 (d) ∞

A. 1

B. 2

C. 0

D. ∞

Answer: C

Watch Video Solution

8. The number of real solution of the equation $\tan^{-1}\sqrt{x^2-3x+2}+\cos^{-1}\sqrt{4x-x^2-3}=\pi$ is

A. one

B. two

C. zero

D. infinite

Answer: C

Watch Video Solution

9. If $\sin^{-1}(x-1)+\cos^{-1}(x-3)+\tan^{-1}\left(\frac{x}{2-x^2}\right)=\cos^{-1}k+\pi$, then the value of k is 1 (b) $-\frac{1}{\sqrt{2}}$ (c) $\frac{1}{\sqrt{2}}$ (d) non of these

A. 1

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

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

D. none of these

Answer: C

Watch Video Solution

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

A. 0

B. 1

C. 2

D. infinite

Answer: C

Watch Video Solution

11. The equation $3\cos^{-1}x - \pi x - \frac{\pi}{2} = 0$has

A. A. one negative solution

B. B. one positive solution

C. C. no solution

D. D. more than one solution

Answer: B

Watch Video Solution

12. Range of $f(x) = \sin^{-1}x + \tan^{-1}x + \sec^{-1}x$ is $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$ (b) $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$ $\left\{\frac{\pi}{4}, \frac{3\pi}{4}\right\}$ (d) none of these

A. $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

B. $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

C. $\left\{\frac{\pi}{4}, \frac{3\pi}{4}\right\}$

D. none of these

Answer: C

Watch Video Solution

13. The value of $\lim_{|x| \to \infty} \cos\left(\tan^{-1}\left(\sin\left(\tan^{-1} x\right)\right)\right)$ is equal to

A. -1

B. $\sqrt{2}$

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

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

Answer: D

Watch Video Solution

14. Find the range of $\tan^{-1}\left(\frac{2x}{1+x^2}\right)$

A. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

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

C. $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right]$

D. $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$

Answer: A

Watch Video Solution

15. Complete solution set of $\left(\cot^{-1}x\right) + 2\left(\tan^{-1}x\right) = 0,$ where [] denotes the greatest integer function, is equal to $(0, \cot 1)$ (b) $(0, \tan 1)$ $(\tan 1, \infty)$ (d) $(\cot 1, \tan 1)$

A. $(0, \cot 1)$

B. $(0, \tan 1)$

C. $(\tan 1, \infty)$

D. $(\cot 1, \tan 1)$

Answer: D

Watch Video Solution

16. The number of integral values of k for which the equation $\sin^{-1}x + \tan^{-1}x = 2k + 1$ has a solution is

A. (a) 1

B. (b) 2

C. (c) 3

D. (d) 4

Answer: B

Watch Video Solution

17. The range of value of p for which the equation $\sin\cos^{-1}\left(\cos\left(\tan^{-1}x\right)\right) = p$ has a solution is $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right.$ (b) (0,1)

$\left(\frac{1}{\sqrt{2}}, 1\right)$ (d) $(-1, 1)$

A. A. $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

B. B. $[0, 1)$

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

D. D. $(-1, 1)$

Answer: B

Watch Video Solution

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

A. 0

B. -1

C. 1

D. 2

Answer: D

Watch Video Solution

19. Complete solution set of $\tan^2(\sin^{-1}x) > 1$ is $\left(-1, -\frac{1}{\sqrt{2}}\right) \cup \left(\frac{1}{\sqrt{2}}, 1\right)$ (b) $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$~$\{0\}$ $(-1, 1)$~$\{0\}$ (d) none of these

A. $\left(-1, -\frac{1}{\sqrt{2}}\right) \cup \left(\frac{1}{\sqrt{2}}, 1\right)$

B. $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$~$\{0\}$

C. $(-1, 1)$~$\{0\}$

D. none of these

Answer: A

Watch Video Solution

20. The trigonometric equation $\sin^{-1} x = 2 \sin^{-1} a$ has a solution for all real values

A. all real values

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

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

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

Answer: C

Watch Video Solution

21. The number of solution of equation $\sin^{-1} x + n \sin^{-1}(1 - x) = \frac{m\pi}{2}$,where n >0, $m \leq 0,$ is

A. 3

B. 1

C. 2

D. none of these

Answer: D

Watch Video Solution

22. If $\left|\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right| < \frac{\pi}{3}, then$ (a) $x \in \left[-\frac{1}{3}, \frac{1}{\sqrt{3}}\right]$ (b) $x \in \left[-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right]$ $x \in \left[0, \frac{1}{\sqrt{3}}\right]$ (d) none of these

A. $x \in \left[-\frac{1}{3}, \frac{1}{\sqrt{3}}\right]$

B. $x \in \left(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$

C. $x \in \left(0, \frac{1}{\sqrt{3}}\right)$

D. none of these

Answer: B

Watch Video Solution

23. The value of $\sin^{-1}(\sin 12) + \cos^{-1}(\cos 12) =$

A. A. zero

B. B. $24 - 2\pi$

C. C. $4\pi - 24$

D. D. none of these

Answer: A

Watch Video Solution

24. The value of the expression $\sin^{-1}\left(\frac{\sin(22\pi)}{7}\right) + \cos^{-1}\left(\frac{\cos(5\pi)}{3}\right) + \tan^{-1}\left(\frac{\tan(5\pi)}{7}\right) + \sin^{-1}(\cos 2)$ is (a) $\frac{17\pi}{42} - 2$ (b) -2 (c) $\frac{-\pi}{21} - 2$ (d) $none of these$

A. $\frac{17\pi}{42} - 2$

B. -2

C. $\frac{-\pi}{21} - 2$

D. none of these

Answer: A

Watch Video Solution

25. The value of $\sin^{-1}\left(\cos\left(\cos^{-1}(\cos x)+\sin^{-1}(\sin x)\right)\right)$, where $x \in \left(\frac{\pi}{2}, \pi\right)$, is equal to $\frac{\pi}{2}$ (b) $-\pi$ (c) π (d) $-\frac{\pi}{2}$

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

B. $-\pi$

C. π

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

Answer: D

Watch Video Solution

26. If $\alpha \in \left(-\frac{3\pi}{2}, -\pi\right)$, then the value of $\tan^{-1}(\cot\alpha) - \cot^{-1}(\tan\alpha) + \sin^{-1}(\sin\alpha) + \cos^{-1}(\cos\alpha)$ is equal to

A. A. $2\pi + \alpha$

B. B. $\pi + \alpha$

C. C. 0

D. D. $\pi - \alpha$

Answer: C

Watch Video Solution

27. $\tan^{-1}\left[\frac{\cos x}{1 + \sin x}\right]$ is equal to

A. $\frac{\pi}{4} - \frac{x}{2}$, for $x \in \left(-\frac{\pi}{2}, \frac{3\pi}{2}\right)$

B. $\frac{\pi}{4} - \frac{x}{2}$, for $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C. $\frac{\pi}{4}, \frac{x}{2}$, for $x \in \left(\frac{3\pi}{2}, \frac{5\pi}{2}\right)$

D. $\frac{\pi}{4} - \frac{x}{2}$, for $x \in \left(-\frac{3\pi}{2}, \frac{\pi}{2}\right)$

Answer: A

Watch Video Solution

28. If $f(x) = x^{11} + x^9 - x^7 + x^3 + 1$ and $f\left(\sin^{-1}(\sin 8\right) = \alpha, \alpha$ is constant, then $f\left(\tan^{-1}(tan8\right)$ is equal to α (b) $\alpha - 2$ (c) $\alpha + 2$ (d) $2 - \alpha$

A. α

B. $\alpha - 2$

C. $\alpha + 2$

D. $2 - \alpha$

Answer: D

Watch Video Solution

29. If $\sin^{-1}:[-1,1]\to\left[\frac{\pi}{2},\frac{3\pi}{2}\right]$ and $\cos^{-1}:[-1,1]\to[0,\pi]$ be two bijective functions, respectively inverse of bijective functions $\sin:\left[\frac{\pi}{2},\frac{3\pi}{2}\right]\to[-1,1]$ and $\cos:[0,\pi]\to[-1,1]$ then $\sin^{-1}x+\cos$
is

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

B. B. π

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

D. D. not a constant

Answer: D

Watch Video Solution

30. Let if then one of the possible value of is:

A. $(0,1)$

B. $(-1,1)-\{0\}$

C. $(-1, 0)$

D. $[-1, 1]$

Answer: A

Watch Video Solution

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

A. 0

B. 1

C. -1

D. none of these

Answer: B

Watch Video Solution

32. There exists a positive real number of x satisfying $\cos\left(\tan^{-1}x\right) = x$. Then the value of $\cos^{-1}\left(\frac{x^2}{2}\right) is \frac{\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{2\pi}{5}$ (d) $\frac{4\pi}{5}$

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

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

C. $\frac{2\pi}{5}$

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

Answer: C

Watch Video Solution

33. If $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right) = 4^0$ then (a)$x = \tan 2^0$ (b) $x = \tan 4^0$ (c) $x = \frac{\tan 1}{4^0}$ (d) $x = \tan 8^0$

A. $x = \tan 2^\circ$

B. $x = \tan 4^\circ$

C. $x = \tan(1/4)^{\circ}$

D. $x = \tan 8^{\circ}$

Answer: D

Watch Video Solution

34. The value of $\frac{\alpha^3}{2}\cos ec^2\left(\frac{1}{2}\frac{\tan^{-1}\alpha}{\beta}\right)+\frac{\beta^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\beta}{\alpha}\right)\right) isequa < o$ $(\alpha+\beta)(\alpha^2+\beta^2)$ (b) $(\alpha+\beta)(\alpha^2-\beta^2)$ $(\alpha+\beta)(\alpha^2+\beta^2)$ (d) none of these

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

Watch Video Solution

35. $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x\right), x \neq 0,$ is equal to x (b) $2x$ (c) $\frac{2}{x}$ (d) none of these

A. x

B. $2x$

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

D. none of these

Answer: C

Watch Video Solution

36. If $\sin^{-1}x+\sin^{-1}y=\frac{\pi}{2}, then\frac{1+x^4+y^4}{x^2-x^2y^2+y^2}$ is equal to 1 (b) 2 (c) $\frac{1}{2}$ (d) none of these

A. 1

B. 2

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

D. none of these

Answer: B

Watch Video Solution

37. Prove that $2\tan^{-1}\left(\cos ec\tan^{-1}x-\tan\cot^{-1}x\right)=\tan^{-1}x(x\neq 0)$

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

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

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

D. none of these

Answer: C

Watch Video Solution

38. If $\sin^{-1}a + \sin^{-1}b + \sin^{-1}c = \pi$, then the value of $a\sqrt{(1-a^2)} + b\sqrt{(1-b^2)} + c\sqrt{(1-c^2)}$ will be (A) $2abc$ (B) abc (C) $\frac{1}{2}abc$ (D) $\frac{1}{3}abc$

A. $2abc$

B. abc

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

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

Answer: A

Watch Video Solution

39. If $a\sin^{-1}x - b\cos^{-1}x = c$, then $a\sin^{-1}x + b\cos^{-1}x$ equal to

A. a. 0

B. b. $\frac{\pi ab + c(b-a)}{a+b}$

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

D. d. $\dfrac{\pi ab + c(a-b)}{a+b}$

Answer: D

Watch Video Solution

40. The solution set of inequality $\log_{\frac{1}{2}} \sin^{-1} x > \log_{\frac{1}{2}} \cos^{-1} x$

A. $x \in \left[0, \dfrac{\pi}{\sqrt{2}}\right]$

B. $x \in \left(\dfrac{1}{\sqrt{2}}, 1\right]$

C. $x \in \left(0, \dfrac{1}{\sqrt{2}}\right)$

D. none of these

Answer: C

Watch Video Solution

41. $\sin^{-1}(\sin\theta) > \cos^{-1}(\sin\theta)$ find the range of θ

A. $\left(\frac{\pi}{4}, \pi\right)$

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

C. $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

D. $\left(\frac{3\pi}{4}, 2\pi\right)$

Answer: C

Watch Video Solution

42. If $\left|\sin^{-1} x\right| + \left|\cos^{-1} x\right| = \frac{\pi}{2}, then$

A. R

B. $[-1, 1]$

C. $[0, 1]$

D. ϕ

Answer: C

Watch Video Solution

43. If $\left(\sin^{-1}x\right)^2 - \left(\cos^{-1}x\right)^2 = a\pi^2$ then find the range of a

Watch Video Solution

44. The number of integer x satisfying $\sin^{-1}|x-2| + \cos^{-1}(1-|3-x|) = \frac{\pi}{2}$ is (a) 1 (b) 2 (c) 3 (d) 4

Watch Video Solution

45. The number of solutions of the equation $\cos^{-1}\left(\frac{1+x^2}{2x}\right) - \cos^{-1}x = \frac{\pi}{2} + \sin^{-1}x$ is 0 (b) 1 (c) 2 (d) 3

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

46. $f(x)=\tan^{-1}x+\tan^{-1}\left(\frac{1}{x}\right); g(x)=\sin^{-1}x+\cos^{-1}x$ are identical functions if (A)$x\in R$ (B) $x>0$ (C) $x\in[-1,1]$ (D) $x\in(0,1]$

A. $x\in R$

B. $x>0$

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

D. $x\in(0,1]$

Answer: D

Watch Video Solution

47. The value of 'a' for which $ax^2+\sin^{-1}(x^2-2x+2)+\cos^{-1}(x^2-2x+2)=0$ has a real

solution is

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

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

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

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

Answer: B

Watch Video Solution

48. If $\sin^{-1}\left(\frac{5}{x}\right)+\sin^{-1}\left(\frac{12}{x}\right)=\frac{\pi}{2}$, then x is equal to $\frac{7}{13}$ (b) $\frac{4}{3}$ (c) 13 (d) $\frac{13}{7}$

A. $\frac{7}{13}$

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

C. 13

D. $\frac{13}{7}$

Answer: C

Watch Video Solution

49. 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 1 (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{3}$ (d) $\frac{1}{3}$

A. 1

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

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

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

Answer: D

Watch Video Solution

50. If $\tan^{-1}(\sin^2\theta-2\sin\theta+3)+\cot^{-1}\left(5^{\sec^2(y)}+1\right)=\frac{\pi}{2}$, then value of $\cos^2\theta-\sin\theta$ is equal to 0 (b) -1 (c) 1 (d) none of these

A. 0

B. -1

C. 1

D. none of these

Answer: C

Watch Video Solution

51. The product of all values of x satisfying the equation $\sin^{-1}\cos\left(\frac{2x^2+10|x|+4}{x^2+5|x|+3}\right)=\cot\left(\cot^{-1}\left(\frac{2-18|x|}{9|x|}\right)\right)+\frac{\pi}{2}$ is (a) 9 (b) -9 (c) -3 (d) -1

A. 9

B. -9

C. -3

D. -1

Answer: A

Watch Video Solution

52. The exhaustive set of value of a for which $a-\cot^{-1}3x=2\tan^{-1}3x+\cos^{1}x\sqrt{3}+\sin^{-1}x\sqrt{3}mayhave$ solution, is $\left[-\frac{\pi}{4},\frac{\pi}{4}\right]$ (b) $\left[\frac{\pi}{2},\frac{3\pi}{2}\right]$ $\left[\frac{2\pi}{3},\frac{4\pi}{3}\right]$ (d) $\left[-\frac{3\pi}{6},\frac{7\pi}{6}\right]$

A. $\left[-\frac{\pi}{4},\frac{\pi}{4}\right]$

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

C. $\left[\frac{2\pi}{3},\frac{4\pi}{3}\right]$

D. $\left[-\frac{3\pi}{6},\frac{7\pi}{6}\right]$

Answer: C

Watch Video Solution

53. If $\cot^{-1}(\sqrt{\cos\alpha}) - \tan^{-1}(\sqrt{\cos\alpha}) = x$, then $\sin x$ is $\dfrac{\tan^2\alpha}{2}$ (b) $\dfrac{\cot^2\alpha}{2}$ (c) $\tan^2\alpha$ (d) $\dfrac{\cot\alpha}{2}$

A. $\sqrt{\tan\alpha}$

B. $\sqrt{\cot\alpha}$

C. $\tan\alpha$

D. $\cot\alpha$

Answer: A

Watch Video Solution

54. The solution set of the equation $\sin^{-1}\sqrt{1-x^2} + \cos^{-1}x = \dfrac{\cot^{-1}\left(\sqrt{1-x^2}\right)}{x} - \sin^{-1}x$ is $[-1,1]-\{0\}$ (b) $(0,1)\cup\{-1\}$ $(-1,0)\cup\{1\}$ (d) $[-1,1]$

A. $[-1,1]-\{0\}$

B. $(0, 1] \cup \{-1\}$

C. $[-1, 0) \cup \{1\}$

D. $[-1, 1]$

Answer: C

Watch Video Solution

55. The value of $\cos^{-1}\sqrt{\frac{2}{3}} - \frac{\cos^{-1}\left(\sqrt{6}+1\right)}{2\sqrt{3}}$ is equal to $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$

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

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

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

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

Answer: D

Watch Video Solution

56. Find, $\theta = \tan^{-1}(2\tan^2\theta) - \tan^{-1}\left(\frac{1}{3}\tan\theta\right)$ then $\tan\theta =$

A. -2

B. -1

C. $2/3$

D. 2

Answer: A

Watch Video Solution

57. If $y = \tan^{-1}.\frac{1}{2} + \tan^{-1}b, (0 < b < 1)$ and $0 < y \le \frac{\pi}{4}$, then the maximum value of b is

A. $1/2$

B. $1/3$

C. $1/4$

D. $2/3$

Answer: B

Watch Video Solution

58. If x, y, z are natural numbers such that $\cot^{-1}x + \cot^{-1}y = \cot^{-1}z$ then the number of ordered triplets (x, y, z) that satisfy the equation is 0 (b) 1 (c) 2 (d) Infinite solutions

A. 0

B. 1

C. 2

D. Infinite solution

Answer: D

Watch Video Solution

59. The value of α such that $\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$, $\sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$, $\sin^{-1}\alpha$ are the angles of a triangle is

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

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

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

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

Answer: D

Watch Video Solution

60. The number of solutions of the equation $\tan^{-1}(1+x)+\tan^{-1}(1-x)=\frac{\pi}{2}$ is 2 (b) 3 (c) 1 (d) 0

A. 2

B. 3

C. 1

D. 0

Answer: C

Watch Video Solution

61. Arithmetic mean of the non-zero solutions of the equation

$$\tan^{-1}\left(\frac{1}{2x+1}\right)+\tan^{-1}\left(\frac{1}{4x+1}\right)=\tan^{-1}\left(\frac{2}{x^2}\right)$$

A. 2

B. 3

C. 4

D. none of these

Answer: B

Watch Video Solution

62. If $\cot^{-1}x + \cot^{-1}y + \cot^{-1}z = \frac{\pi}{2}, x, y, z > 0 and xy < 1,$ then $x + y + z$ is also equal to $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ (b) xyz $xy + yz + zx$ (d) none of these

A. $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$

B. xyz

C. $xy + yz + zx$

D. none of these

Answer: B

Watch Video Solution

63. 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

Watch Video Solution

64. The value of $\tan^{-1}\left(\frac{x\cos\theta}{1-x\sin\theta}\right)-\cot^{-1}\left(\frac{\cos\theta}{x-\sin\theta}\right) is\ 2\theta$ (b) θ (c) $\frac{\theta}{2}$ (d) independent of θ

A. 2θ

B. θ

C. $\theta/2$

D. independent of θ

Answer: B

Watch Video Solution

65. If $\cot^{-1}(\sqrt{\cos\alpha}) - \tan^{-1}(\sqrt{\cos\alpha}) = x$, then $\sin x$ is $\frac{\tan^2\alpha}{2}$ (b) $\frac{\cot^2\alpha}{2}$ (c) $\tan^2\alpha$ (d) $\frac{\cot\alpha}{2}$

A. $\tan^2.\ \frac{\alpha}{2}$

B. $\cot^2.\ \frac{\alpha}{2}$

C. $\tan\alpha$

D. $\cot.\ \frac{\alpha}{2}$

Answer: A

Watch Video Solution

66. $\sum_{r=1}^{n}\sin^{-1}\left(\frac{\sqrt{r}-\sqrt{r-1}}{\sqrt{r(r+1)}}\right) isequa < o$ $\tan^{-1}(\sqrt{n}) - \frac{\pi}{4}$ $\tan^{-1}(\sqrt{n+1}) - \frac{\pi}{4}$ $\tan^{-1}(\sqrt{n})$ (d) $\tan^{-1}(\sqrt{n}+1)$

A. $\tan^{-1}(\sqrt{n}) - \frac{\pi}{4}$

B. $\tan^{-1}(\sqrt{n+1}) - \frac{\pi}{4}$

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

D. $\tan^{-1}(\sqrt{n+1})$

Answer: C

Watch Video Solution

67. $\sum_{m=1}^{n}\tan^{-1}\left(\frac{2m}{m^4+m^2+2}\right)$ is equal to

A. $\tan^{-1}\left(\frac{n^2+n}{n^2+n+2}\right)$

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

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

D. none of these

Answer: A

Watch Video Solution

68. The value of

$\frac{\tan^{-1}4}{7}+\frac{\tan^{-1}4}{19}+\frac{\tan^{-1}4}{39}+\frac{\tan^{-1}4}{67}+\infty equals$

$\tan^{-1}1+\frac{\tan^{-1}1}{2}+\frac{\tan^{-1}1}{3}$ $\tan^{-1}+\cot^{-1}3$

$\cot^{-1}1+\frac{\cot^{-1}1}{2}\frac{\cot^{-1}1}{3}$ $\cot^{-1}1+\tan^{-1}3$

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

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

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

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

D. $\cot^{-1}1+\tan^{-1}3$

Answer: B

Watch Video Solution

69. The sum of series

$\sec^{-1}\sqrt{2}+\sec^{-1}.\frac{\sqrt{10}}{3}+\sec^{-1}.\frac{\sqrt{50}}{7}+\ldots+\sec^{-1}\sqrt{\frac{(n^2+1)(n^2-2n}{(n^2-n+1)^2}}$

is

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

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

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

D. $\tan^{-1}(n-1)$

Answer: B

Watch Video Solution

70. If $\frac{1}{2}\sin^{-1}\left[\frac{3\sin 2\theta}{5+4\cos 2\theta}\right] = \tan^{-1} x, \quad \text{then} \quad x =$

A. $\tan 3\theta$

B. $3\tan\theta$

C. $(1/3)\tan\theta$

D. $3\cot\theta$

Answer: C

Watch Video Solution

71. The value $2\tan^{-1}\left[\sqrt{\frac{a-b}{a+b}}\tan\left(\frac{\theta}{2}\right)\right]$ is equal to $\cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$ (b) $\cos^{-1}\left(\frac{a+b\cos\theta}{a\cos\theta+b}\right)$ $\cos^{-1}\left(\frac{a\cos\theta}{a+b\cos\theta}\right)$ (d) $\cos^{-1}\left(\frac{b\cos\theta}{a\cos\theta+b}\right)$

Watch Video Solution

72. 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 $[a, b, \in (0, 1)]$ $\frac{a-b}{1+ab}$ (b) $\frac{b}{1+ab}$ (c) $\frac{b}{1+ab}$ (d) $\frac{a+b}{1-ab}$

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

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

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

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

Answer: D

Watch Video Solution

73. If $3\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+2\tan^{-1}\left(\frac{2x}{1-x^2}\right)=\frac{\pi}{3}, where$ then x is equal to $\frac{1}{\sqrt{3}}$ (b) $-\frac{1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) $-\frac{\sqrt{3}}{4}$

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

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

C. $\sqrt{3}$

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

Answer: A

Watch Video Solution

74. If

$$x_1 = 2\tan^{-1}\left(\frac{1+x}{1-x}\right), x_2 = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right), \quad \text{where} \quad x \in (0, 1),$$

then 2($x_1 + x_2$) is equal to

A. 0

B. 2π

C. π

D. none of these

Answer: C

Watch Video Solution

75. If the equation $x^3 + bx^2 + cx + 1 = 0, (b < c)$, has only one real root α , then the value of $2\tan^{-1}(\cos ec\alpha) + \tan^{-1}(2\sin\alpha\sec^2\alpha)$ is

(a) $-\pi$

(b) $-\frac{\pi}{2}$

(c) $\frac{\pi}{2}$

(d) π

A. $-\pi$

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

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

D. π

Answer: A

Watch Video Solution

76. The value of $\sin^{-1}\left[x\sqrt{1-x}+\sqrt{x}\sqrt{1-x^2}\right]$ is equal to

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

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

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

D. none of these

Answer: B

Watch Video Solution

77. If $\cos^{-1}x - \cos^{-1}\left(\frac{y}{2}\right) = \alpha, then 4x^2 - 4xy\cos\alpha + y^2$ is equal to 4 (b) $2\sin^2\alpha$ (c) $-4\sin^2\alpha$ (d) $4\sin^2\alpha$

A. 4

B. $2\sin^2\alpha$

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

D. $4\sin^2\alpha$

Answer: D

Watch Video Solution

78. 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: B

Watch Video Solution

79. If $f(x) = \sin^{-1}\left(\frac{\sqrt{3}}{2}x - \frac{1}{2}\sqrt{1-x^2}\right), -\frac{1}{2} \leq x \leq 1, then f(x)$ is equal to $\sin^{-1}\left(\frac{1}{2}\right) - \sin^{-1}(x)$ $\sin^{-1}x - \frac{\pi}{6}$ $\sin^{-1}x + \frac{\pi}{6}$ (d) none of these

A. $\sin^{-1}\left(\frac{1}{2}\right) - \sin^{-1}(x)$

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

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

D. none of these

Answer: B

Watch Video Solution

80. If $2^2\pi / \sin^{(-1)x} - 2(a+2)^\pi / \sin^{(-1)x} + 8a < 0$ for at least one real x, then $\frac{1}{8} \leq a < 2$ (b) $a < 2$ $a \in R - \{2\}$ (d) $a \in \left[0, \frac{1}{8}\right] \cup (2, \infty)$

A. $\frac{1}{8} \leq a \leq 2$

B. $a \leq 2$

C. $a \in R - \{2\}$

D. $a \in \left[0, \frac{1}{8}\right) \cup (2, \infty)$

Answer: D

Watch Video Solution

Multiple correct answer type

1. If $\alpha, \beta(\alpha < \beta)$ are the roots of equation $6x^2 + 11x + 3 = 0$, then which following real? (a) $\cos^{-1}\alpha$ (b) $\sin^{-1}\beta$ (c) $\cos ec^{-1}\alpha$ (d) both $\cot^{-1}\alpha$ and $\cot^{-1}\beta$

A. $\cos^{-1}\alpha$

B. $\sin^{-1}\beta$

C. $\cos ec^{-1}\alpha$

D. Both $\cot^{-1}\alpha$ and $\cot^{-1}\beta$

Answer: B::C::D

Watch Video Solution

2. $2\tan^{-1}(-2)$ is equal to (a)$-\cos^{-1}\left(\frac{-3}{5}\right)$ (b) $-\pi + \frac{\cos^{-1}3}{5}$ (c) $-\frac{\pi}{2} + \tan^{-1}\left(-\frac{3}{4}\right)$ (d) $-\pi\cot^{-1}\left(-\frac{3}{4}\right)$

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

B. $-\pi+\cos^{-1}.\ \frac{3}{5}$

C. $-\frac{\pi}{2}+\tan^{-1}\left(-\frac{3}{4}\right)$

D. $-\pi+\cot^{-1}\left(-\frac{3}{4}\right)$

Answer: A::B::C

Watch Video Solution

3. Which of the following is/are the value of $\cos\left[\frac{1}{2}\cos^{-1}\left(\cos\left(-\frac{14\pi}{5}\right)\right)\right]$? (a)$\cos\left(-\frac{7\pi}{5}\right)$ (b) $\sin\left(\frac{\pi}{10}\right)$ (c) $\cos\left(\frac{2\pi}{5}\right)$ (d) $-\cos\left(\frac{3\pi}{5}\right)$

A. $\cos\left(-\frac{7\pi}{5}\right)$

B. $\sin\left(\frac{\pi}{10}\right)$

C. $\cos\left(\frac{2\pi}{5}\right)$

D. $-\cos\left(\frac{3\pi}{5}\right)$

Answer: B::C::D

Watch Video Solution

4. Which of the following is not a rational number. a. $\sin\left(\tan^{-1}3+\tan^{-1}.\ \frac{1}{3}\right)$ b.$\cos\left(\frac{\pi}{2}-\sin^{-1}.\ \frac{3}{4}\right)$

Watch Video Solution

5. Which of the following quantities is/are positive? $\cos\left(\tan^{-1}(tan4)\right)$ (b) $\sin\left(\cot^{-1}(\cot 4)\right)$ $\tan\left(\cos^{-1}(\cos 5)\right)$ (d) $\cot\left(\sin^{-1}(\sin 4)\right)$

A. $\cos\left(\tan^{-1}(\tan 4)\right)$

B. $\sin\left(\cot^{-1}(\cot 4)\right)$

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

D. $\cot\left(\sin^{-1}(\sin 4)\right)$

Answer: A::B::C

Watch Video Solution

6. If $x < 0, then \tan^{-1} x$ is equal to $-\pi + \frac{\cot^{-1} 1}{x}$ (b) $\frac{\sin^{-1} x}{\sqrt{1+x^2}}$ $-\frac{\cos^{-1} 1}{\sqrt{1+x^2}}$ (d) $-\cos ec^{-1} \frac{\sqrt{1+x^2}}{x}$

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

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

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

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

Answer: A::B::C

Watch Video Solution

7. If $-1 < x < 0$, then $\cos^{-1} x$ is equal to

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

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

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

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

Answer: A::B::C::D

Watch Video Solution

8. If $(\sin^{-1}x + \sin^{-1}w)(\sin^{-1}y + \sin^{-1}z) = \pi^2$, then $D = |x^{N_1}y^{N_3}z^{N_3}w^{N_4}|(N_1, N_2, N_3, N_4 \in N)$ has a maximum value of 2 different D are possible has a minimum value of -2

A. has a maximum value of 2

B. has a minimum value of 0

C. 16 different D are possible

D. has a minimum value of -2

Answer: A::C::D

Watch Video Solution

9. Indicate the relation which can hold in their respective domain for infinite values of x: $(a)\tan\left|\tan^{-1}x\right| = |x|$ (b) $\cot\left|\cot^{-1}x\right| = |x|$ $(c)\tan^{-1}|\tan x| = |x|$ (d) $\sin\left|\sin^{-1}x\right| = |x|$

A. $\tan\left|\tan^{-1}x\right| = |x|$

B. $\cot\left|\cot^{-1}x\right| = |x|$

C. $\tan^{-1}|\tan x| = |x|$

D. $\sin\left|\sin^{-1}x\right| = |x|$

Answer: A::B::C::D

Watch Video Solution

10. If $\cot^{-1}\left(\frac{n^2 - 10n + 21.6}{\pi}\right) > \frac{\pi}{6}$, then the possible values of n is/are (a) 3 (b) 2 (c) 4 (d) 8

A. 3

B. 2

C. 4

D. 8

Answer: A::C

Watch Video Solution

11. If $z = \sec^{-1}\left(x + \frac{1}{x}\right) + \sec^{-1}\left(y + \frac{1}{y}\right)$, where $xy < 0$, then the possible values of z is (are) $\frac{8\pi}{10}$ (b) $\frac{7\pi}{10}$ (c) $\frac{9\pi}{10}$ (d) $\frac{21\pi}{20}$

A. $\frac{8\pi}{10}$

B. $\frac{7\pi}{10}$

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

D. $\frac{21\pi}{20}$

Answer: C::D

Watch Video Solution

12. The value of $k(k > 0)$ such that the length of the longest interval in which the function $f(x) = \sin^{-1}|\sin kx| + \cos^{-1}(\cos kx)$ is constant is $\frac{\pi}{4}$ is/ are 8 (b) 4 (c) 12 (d) 16

A. 8

B. 4

C. 12

D. 16

Answer: B

Watch Video Solution

13. Which of the following pairs of function/functions has same graph? $y = \tan(\cos^{-1} x); y = \frac{\sqrt{1-x^2}}{x}$ $y = tan(\cot^{-1} x); y = \frac{1}{x}$ $y = \sin(\tan^{-1} x); y = \frac{x}{\sqrt{1+x^2}}$ $y = \cos(\tan^{-1} x); y = \sin(\cot^{-1} x)$

A. $y = \tan\left(\cos^{-1} x\right), y = \frac{\sqrt{1 - x^2}}{x}$

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

C. $y = \sin\left(\tan^{-1} x\right), y = \frac{x}{\sqrt{1 + x^2}}$

D. $y = \cos\left(\tan^{-1} x\right), y = \sin\left(\cot^{-1} x\right)$

Answer: A::B::C::D

Watch Video Solution

14. If $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$ and $\sin 2x = \cos 2y$, then $x = \frac{\pi}{8} + \sqrt{\frac{1}{2} - \frac{\pi^2}{64}}$ $\sqrt{\frac{1}{2} - \frac{\pi^2}{64}} - \frac{\pi}{12}$ $x = \frac{\pi}{12} + \sqrt{\frac{1}{2} - \frac{\pi^2}{64}}$ $y = \sqrt{\frac{1}{2} - \frac{\pi^2}{64}} - \frac{\pi}{8}$

A. $x = \frac{\pi}{8} + \sqrt{\frac{1}{2} - \frac{\pi^2}{64}}$

B. $y = \sqrt{\frac{1}{2} - \frac{\pi^2}{64}} - \frac{\pi}{12}$

C. $x = \frac{\pi}{12} + \sqrt{\frac{1}{2} - \frac{\pi^2}{64}}$

D. $y = \sqrt{\frac{1}{2} - \frac{\pi^2}{64}} - \frac{\pi}{8}$

Answer: A::D

Watch Video Solution

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

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

B. $2\left(\sin^{-1}x+\sin^{-1}y+\sin^{-1}z\right)=\cos^{-1}x+\cos^{-1}y+\cos^{-1}z$

C. $xy+yz+zx=x+y+z-1$

D. $\left(x+\frac{1}{x}\right)+\left(y+\frac{1}{y}\right)+\left(z+\frac{1}{z}\right)>6$

Answer: A::B

Watch Video Solution

16. If $\sin^{-1}\left(a-\frac{a^2}{3}+\frac{a^3}{9}-\ldots\right)+\cos^{-1}\left(1+b+b^2+\ldots\right)=\frac{\pi}{2}$ then find a and b

A. $b = \frac{2a - 3}{3a}$

B. $b = \frac{3a - 2}{2a}$

C. $a = \frac{3}{2 - 3b}$

D. $a = \frac{2}{3 - 2b}$

Answer: A::C

Watch Video Solution

17. If $\tan^{-1}(x^2 + 3|x| - 4) + \cot^{-1}(4\pi + \sin^{-1} s \in 14) = \frac{\pi}{2}, then$ the value of $\sin^{-1} 2x$ is $6 - 2\pi$ (b) $2\pi - 6$ $\pi - 3$ (d) $3 - \pi$

A. $6 - 2\pi$

B. $2\pi - 6$

C. $\pi - 3$

D. $3 - \pi$

Answer: A::B

Watch Video Solution

18. If $2\tan^{-1}x+\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is independent of x, then (a)x >1 (b) x<-1

A. $x > 1$

B. $x < -1$

C. $0 < x < 1$

D. $-1 < x < 0$

Answer: A::B

Watch Video Solution

19. If $\alpha=\tan^{-1}\left(\frac{4x-4x^3}{1-6x^2+x^4}\right)$, $\beta=2\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and $\frac{\tan\pi}{8}=k$, then (a) $\alpha+\beta=\pi$ for $x\in\left[1,\frac{1}{k}\right]$ (b)$\alpha+\beta$ for

$x \in (-k, k)$ (c) $\alpha + \beta = \pi$ for$x \in \left[1, \frac{1}{k}\right]$ (d) $\alpha + \beta = 0$ for $x \in [-k, k]$

A. $\alpha + \beta = \pi \text{ for } x \in \left[1, \frac{1}{k}\right)$

B. $\alpha = \beta \text{ for } x \in (-k, k)$

C. $\alpha + \beta = -\pi \text{ for } x \in \left[1, \frac{1}{k}\right)$

D. $\alpha + \beta = 0 \text{ for } x \in (-k, k)$

Answer: A::B

Watch Video Solution

20. $2\tan\left(\tan^{-1}(x) + \tan^{-1}(x^3)\right)$,where $x \in R - \{-1, 1\}$, is equal to

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

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

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

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

Answer: A::B::C

Watch Video Solution

21. Let $\alpha = \sin^{-1}\left(\frac{36}{85}\right), \beta = \cos^{-1}\left(\frac{4}{5}\right)$ and $\gamma = \tan^{-1}\left(\frac{8}{15}\right)$ Then

A. $\cot\alpha + \cot\beta + \cot\gamma = \cot\alpha\cot\beta\cot\gamma$

B. $\tan\alpha\tan\beta + \tan\beta\tan\gamma + \tan\alpha\tan\gamma = 1$

C. $\tan\alpha + \tan\beta + \tan\gamma = \tan\alpha\tan\beta\tan\gamma$

D. $\cot\alpha\cot\beta + \cot\beta\cot\gamma + \cot\alpha\cot\gamma = 1$

Answer: A::B

Watch Video Solution

22. If $S_{\infty} = \cot^{-1}(3) + \cot^{-1}(7) + \cot^{-1}(13) + \cot^{-1}(21) + \ldots.., \infty$ terms, then find the value

Watch Video Solution

23. Equation $1 + x^2 + 2x\sin(\cos^{-1} y) = 0$ is satisfied by (a) exactly one value of x (b) exactly two value of x (c) exactly one value of y (d) exactly two value of y

A. exactly one value of x

B. exactly two values of x

C. exactly one value of y

D. exactly two values of y

Answer: A::C

Watch Video Solution

24. To the equation $2^2\pi / \cos^{(-1)x} - \left(a + \frac{1}{2}\right)2^{\pi} / \cos^{(-1)x} - a^2 = 0$ has only one real root, then $1 \leq a \leq 3$ (b) $a \geq 1$ $a \leq -3$ (d) $a \geq 3$

A. $1 \leq a \leq 3$

B. $a \geq 1$

C. $a \leq -3$

D. $a \geq 3$

Answer: B::C

Watch Video Solution

Linked comprehension type

1. For $x, y, z, t \in R, \sin^{-1} x + \cos^{-1} y + \sec^{-1} z \geq t^2 - \sqrt{2\pi t} + 3\pi$

The principal value of $\cos^{-1}(\cos 5t^2)$ is

A. 1

B. 0

C. 2

D. -1

Answer: D

Watch Video Solution

2. For $x, y, z, t \in R, \sin^{-1} x + \cos^{-1} y + \sec^{-1} z \geq t^2 - \sqrt{2\pi t} + 3\pi$

The principal value of $\cos^{-1}(\cos 5t^2)$ is

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

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

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

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

Answer: B

Watch Video Solution

3. For $x, y, z, t \in R, \sin^{-1} x + \cos^{-1} y + \sec^{-1} z \geq t^2 - \sqrt{2\pi t} + 3\pi$

The value of $\cos^{-1}(\min\{x, y, z\})$ is

A. 0

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

C. π

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

Answer: C

Watch Video Solution

4. If $ax + b\sec(\tan^{-1} x) = c$ and $ay + b\sec(\tan^{-l} y) = c$, then $\frac{x+y}{1-xy}$ is equal to

A. $\frac{2ab}{a^2 - b^2}$

B. $\frac{c^2 - b^2}{a^2 - b^2}$

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

D. none of these

Answer: B

Watch Video Solution

5. If $ax + b\sec(\tan^{-1}x) = c$ and $ay + b\sec(\tan^{-l}y) = c$, then $\frac{x+y}{1-xy}$ is equal to

A. $\frac{2ac}{a^2 - b^2}$

B. $\frac{c^2 - b^2}{a^2 - b^2}$

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

D. none of these

Answer: A

Watch Video Solution

6. If $ax + b\sec(\tan^{-1}x) = c$ and $ay + b\sec(\tan^{-l}y) = c$, then $\frac{x+y}{1-xy}$ is equal to

A. $\frac{2ab}{a^2 - c^2}$

B. $\dfrac{2ac}{a^2 - c^2}$

C. $\dfrac{c^2 - b^2}{a^2 + b^2}$

D. none of these

Answer: B

Watch Video Solution

7. Consider the system of equations $\cos^{-1}x + \left(\sin^{-1}y\right)^2 = \dfrac{p\pi^2}{4}$ and $-\left(\cos^{-1}x\right) + \left(\sin^{-1}y\right)^2 = \dfrac{\pi^2}{16}, p \in Z$

The value of p for which system has a solution is

A. 1

B. 2

C. 0

D. -1

Answer: B

Watch Video Solution

8. If $n \in N$ and the set of equations, $(\sin^{-1} y)^2 + (\cos^{-1} x) = \frac{n\pi^2}{4}$ and $(\sin^{-1} y)^2 - (\cos^{-1} x) = \frac{\pi^2}{16}$ is consistent,then n can be equal to-

Watch Video Solution

9. Consider the system of equations $\cos^{-1} x + (\sin^{-1} y)^2 = \frac{p\pi^2}{4}$ and $(\cos^{-1} x)(\sin^{-1} y)^2 = \frac{\pi^4}{16}, p \in Z$ The value of x which satisfies the system of equations is

A. A. 1

B. B. -1

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

D. D. none of these

Answer: C

Watch Video Solution

10. Let $\cos^{-1}(4x^3 - 3x) = a + b\cos^{-1}x$

If $x \in \left[-1, -\frac{1}{2}\right)$, then the value of $a + b\pi$ is

A. 2π

B. 3π

C. π

D. -2π

Answer: C

Watch Video Solution

11. Let $\cos^{-1}(4x^3 - 3x) = a + b\cos^{-1}x$

If $x \in \left[-1, -\frac{1}{2}\right)$, then the value of $a + b\pi$ is

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

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

C. π

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

Answer: A

Watch Video Solution

12. Let $\cos^{-1}(4x^3 - 3x) = a + b\cos^{-1}x$

If $x \in \left(\frac{1}{2}, 1\right]$, then the value of 'a+b pi' is

A. $-1/3$

B. -3

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

D. 3.14

Answer: D

Watch Video Solution

13. Let $a=\cos^{-1}\cos 20, b=\cos^{-1}\cos 30$ and $c=\sin^{-1}\sin(a+b)$

then

The largest integer x for which $\sin^{-1}(\sin x)\geq|x-(a+b+c)|$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

14. Let $a=\cos^{-1}\cos 20, b=\cos^{-1}\cos 30$ and $c=\sin^{-1}\sin(a+b)$

then

If $5\sec^{-1}x+10\sin^{-1}y=10(a+b+c)$ then the value of

$\tan^{-1}x+\cos^{-1}(y-1)$ is

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

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

C. C. π

D. D. 0

Answer: B

Watch Video Solution

15. Consider the function $f(x) = \sin^{-1} x$, having principal value branch $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ and $g(x) = \cos^{-1} x$, having principal value brach $[0, \pi]$

The value of $f(\sin 10)$ is

A. $10 - 3\pi$

B. $10 - 2\pi$

C. $10 - \frac{5\pi}{2}$

D. $\frac{7\pi}{2} - 10$

Answer: B

Watch Video Solution

16. Consider the function $f(x) = \sin^{-1} x$, having principal value branch $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ and $g(x) = \cos^{-1} x$, having principal value brach $[0, \pi]$

For $\sin^{-1} x < \frac{3\pi}{4}$, solution set of x is

A. $\left(\frac{1}{\sqrt{2}}, 1\right]$

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

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

D. $[-1, 1]$

Answer: A

Watch Video Solution

Matrix match type

1. Match the following List I to List II

List I	List II
a. $\sin^{-1}\frac{4}{5}+2\tan^{-1}\frac{1}{3}=$	**p.** $\pi/6$
b. $\sin^{-1}\frac{12}{13}+\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{63}{16}=$	**q.** $\pi/2$
c. 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,	**r.** $\pi/4$
d. $\tan^{-1}\frac{1}{7}+2\tan^{-1}\frac{1}{3}=$	**s.** π

Watch Video Solution

2. Match the following lists :

List I	List II
a. Number of roots of the equation $\sin^{-1}(\sin x) = \frac{x}{4}$ is	**p.** 2
b. Number of roots of the equation $\cos^{-1}(\cos x) = \frac{x}{4}$ is	**q.** 3
c. Number of roots of the equation $\tan^{-1}(\tan x) = \frac{x}{4}$ is	**r.** 4
d. Number of roots of the equation $\cot^{-1}(\cot x) = \frac{x}{4}$ is	**s.** 5

A. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ q & s & r & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ s & r & p & q \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ q & r & q & p \end{matrix}$

Answer: D

View Text Solution

3. Match the following lists :

List I	List II
a. If $3\sin^{-1}x = \pi - \sin^{-1}(3x-4x^3)$, then	p. $x \in \left[\frac{1}{\sqrt{2}}, 1\right]$
b. If $2\tan^{-1}x = \pi - \sin^{-1}\frac{2x}{1+x^2}$, then	q. $x \in \left[\frac{1}{2}, 1\right]$
c. If $2\tan^{-1}x = \pi + \tan^{-1}\frac{2x}{1-x^2}$, then	r. $x \in (1, \infty)$
d. If $2\sin^{-1}x = \pi - \sin^{-1}\left(2x\sqrt{1-x^2}\right)$, then	s. $x \in [1, \infty)$

A. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ q & s & r & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ s & r & p & q \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ r & p & s & q \end{matrix}$

Answer: B

Watch Video Solution

4. Match the following List I to List II

List I	List II
a. If $(\sin^{-1}x)^2 + (\sin^{-1}y)^2 = \dfrac{\pi^2}{2}$, then $x^3 + y^3$ can be	p. 0
b. $(\cos^{-1}x)^2 + (\cos^{-1}y)^2 = 2\pi^2$, then $x^5 + y^5$ can be	q. −2
c $(\sin^{-1}x)^2(\cos^{-1}y)^2 = \dfrac{\pi^4}{4}$, then $x - y$ can be	r. 2
d. $\lvert\sin^{-1}x - \sin^{-1}y\rvert = \pi$, then $x - y$ can be	s. −1

A. $\begin{matrix} a & b & c & d \\ r & q & p & s \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ q & s & p & r \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

Answer: C

Watch Video Solution

5. Match the following List I to List II

List I	List II
a. Range of $f(x)=\sin^{-1}x+\cos^{-1}x+\cot^{-1}x$ is	**p.** $\left[0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\pi\right]$
b. Range of $f(x)=\cot^{-1}x+\tan^{-1}x+\operatorname{cosec}^{-1}x$ is	**q.** $\left[\frac{\pi}{2},\frac{3\pi}{2}\right]$
c. Range of $f(x)=\cot^{-1}x+\tan^{-1}x+\cos^{-1}x$ is	**r.** $\{0,\pi\}$
d. Range of $f(x)=\sec^{-1}x+\operatorname{cosec}^{-1}x+\sin^{-1}x$ is	**s.** $\left[\frac{3\pi}{4},\frac{5\pi}{4}\right]$

Watch Video Solution

6. Match the column I with Column II.

Column I		Column II	
(A)	The shape of rubber heel changes under stress	(p)	Young's modulus of elasticity is involved
(B)	In a suspended bridge, there is a strain in the ropes by the load of the bridge	(q)	Bulk modulus of elasticity is involved
(C)	In an automobile tyre, when air is compressed, the shape of tyre changes	(r)	Modulus of rigidity is involved
(D)	A solid body is subjected to a deforming force	(s)	All the moduli of elasticity are involved

View Text Solution

7. Match List I with List II and select the correct answer using the codes given below the lists:

List I	List II
a. $\left(\frac{1}{y^2}\left(\frac{\cos(\tan^{-1}y)+y\sin(\tan^{-1}y)}{\cot(\sin^{-1}y)+\tan(\sin^{-1}y)}\right)^2+y^4\right)^{1/2}$ takes value	**p.** $\frac{1}{2}\sqrt{\frac{5}{3}}$
b. If $\cos x+\cos y+\cos z=0=\sin x+\sin y+\sin z$ then possible value of $\cos\frac{x-y}{2}$ is	**q.** $\sqrt{2}$
c. If $\cos\left(\frac{\pi}{4}-x\right)\cos 2x+\sin x\sin 2x\sec x=\cos x\sin 2x\sec x+\cos\left(\frac{\pi}{4}+x\right)\cos 2x$ then possible value of $\sec x$ is	**r.** $1/2$
d. If $\cot\left(\sin^{-1}\sqrt{1-x^2}\right)=\sin(\tan^{-1}(x\sqrt{6})), x\neq 0$, then possible value of x is	**s.** 1

A. $\begin{matrix} a & b & c & d \\ s & r & p & q \end{matrix}$

B. $\begin{matrix} a & b & c & d \\ s & r & q & p \end{matrix}$

C. $\begin{matrix} a & b & c & d \\ r & s & q & p \end{matrix}$

D. $\begin{matrix} a & b & c & d \\ r & s & p & q \end{matrix}$

Answer: B

Watch Video Solution

8. Match List I with List II and select the correct answer using the codes given below the lists :

List I	List II
a. Let $y(x) = \cos(3\cos^{-1} x)$, $x \in [-1, 1]$, $x \neq \pm \frac{\sqrt{3}}{2}$. Then $\frac{1}{y(x)}\left\{(x^2-1)\frac{d^2y(x)}{dx^2} + x\frac{dy(x)}{dx}\right\}$ equals	**p.** 1
b. Let $A_1, A_2, \ldots, A_n$ $(n > 2)$ be the vertices of a regular polygon of n sides with its centre at the origin. Let $\vec{a}_k$ be the position vector of the point A_k, $k = 1, 2, \ldots n$. If $\left\vert\sum_{k=1}^{n-1}(\vec{a}_k \times \vec{a}_{k+1})\right\vert = \left\vert\sum_{k=1}^{n-1}(\vec{a}_k \cdot \vec{a}_{k+1})\right\vert$, then the minimum value of n is	**q.** 2
c. If the normal from the point $P(h, 1)$ on the ellipse $\frac{x^2}{6} + \frac{y^2}{3} = 1$ is perpendicular to the line $x + y = 8$, then the value of h is	**r.** 8
d. Number of positive solutions 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	**s.** 9

A.

a	b	c	d
s	r	p	q

B.

a	b	c	d
q	s	r	p

C.

a	b	c	d
s	r	p	q

D. $\begin{matrix} a & b & c & d \\ q & s & p & r \end{matrix}$

Answer: A

Watch Video Solution

Numerical value type

1. The solution set of inequality $(\cot^{-1} x)(\tan^{-1} x) + \left(2 - \frac{\pi}{2}\right), \cot^{-1} x - 3\tan^{-1} x - 3\left(2 - \frac{\pi}{2}\right) > 0$ is (a, b), then the value of $\cot^{-1} a + \cot^{-1} b$ is____

Watch Video Solution

2. If $x = \sin^{-1}(a^6 + 1) + \cos^{-1}(a^4 + 1) - \tan^{-1}(a^2 + 1), a \in R$, then the value of $\sec^2 x$ is______

Watch Video Solution

3. If the roots of the equation $x^3 - 10x + 11 = 0$ are u, v, and w, then the value of $3\cos ec^2\left(\tan^{-1}u + \tan^{-1}v + \tan^{-1}w\right)$ is ___

Watch Video Solution

4. The number of values of x for which $\sin^{-1}\left(x^2 - \frac{x^4}{3} + \frac{x^6}{9}\ldots\right) + \cos^{-1}\left(x^4 - \frac{x^8}{3} + \frac{x^{12}}{9}..\right) = \frac{\pi}{2}$, where \`0lt=|x|

Watch Video Solution

5. If the domain of the function $f(x) = \sqrt{3\cos^{-1}(4x) - \pi}$ is $[a, b]$, then the value of $(4a + 64b)$ is ___

Watch Video Solution

6. If $0 < \cos^{-1}(x) < 1$ and $1 + \sin(\cos^{-1} x) + \sin^2(\cos^{-1} x) + \sin^3(\cos^{-1} x)$ + ... =2 then the value of 12 x^2 is____

Watch Video Solution

7. If $\tan^{-1}\left(x + \frac{3}{x}\right) - \tan^{-1}\left(x - \frac{3}{x}\right) = \tan^{-1}$(6/x)$thenthevalueof$ x^4` is_____.

Watch Video Solution

8. If range of function $f(x) = \sin^{-1} x + 2\tan^{-1} x + x^2 + 4x + 1$ is $[p, q]$, then the value of $(p + q)$ is______>

Watch Video Solution

9. The number of roots of the equation is x^2 -7x+12=0

Watch Video Solution

10. If the area enclosed by the curves $f(x) = \cos^{-1}(\cos x)$ and $g(x) = \sin^{-1}(\cos x)$ in $x \in [9\pi/4, 15\pi/4]$ is

(where a and b are coprime), then the value of b is ___

Watch Video Solution

11. Absolute value of sum of all integers in the domain of $f(x) = \cot^{-1}\sqrt{(x+3)x} + \cos^{-1}\sqrt{x^2+3x+1}$ is______

Watch Video Solution

12. The least value of $(1+\sec^{-1}x)(1+\cos^{-1}x)$ is _______

Watch Video Solution

13. Let $\cos^{-1}(x) + \cos^{-1}(2x) + \cos^{-1}(3x) be \pi \cdot$ If x satisfies the equation $ax^3 + bx^2 + cx - c_1 = 0$, then the value of $(b - a - c)$ is________

Watch Video Solution

14. The number of integral values of x satisfying the equation $\tan^{-1}(3x) + \tan^{-1}(5x) = \tan^{-1}(7x) + \tan^{-1}(2x)$ is ____

Watch Video Solution

15. Number of solutions of equation $\sin(\cos^{-1}(\tan(\sec^{-1} x))) = \sqrt{1 + x}$ is/are ____

Watch Video Solution

16. If the equation $\sin^{-1}(x^2 + x + 1) + \cos^{-1}(\lambda x + 1) = \frac{\pi}{2}$ has exactly two solutions for $\lambda \in [a, b]$, then the value of $a + b$ is

Watch Video Solution

17. $\sin\left\{2\left(\frac{\sin^{-1}\left(\sqrt{5}\right)}{3} - \frac{\cos^{-1}\left(\sqrt{5}\right)}{3}\right)\right\}$ is equal to $\frac{k\sqrt{5}}{81}$ then $k =$

Watch Video Solution

18. The number of solutions of $\cos\left(2\sin^{-1}\left(\cot\left(\tan^{-1}\left(\sec\left(6\cos ec^{-1}x\right)\right)\right)\right)\right) + 1 = 0$ where $x > 0$ is

Watch Video Solution

Archives (JEE MAIN)

1. If x, y , z are in A.P and $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are also in A.P.,then

A. $x = y = z$

B. $2x = 3y = 6z$

C. $6x = 3y = 2z$

D. $6x = 4y = 3z$

Answer: A

Watch Video Solution

2. Let, $\tan^{-1}y = \tan^{-1}x + \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $|x| < \frac{1}{\sqrt{3}}$. Then a value of y is:

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

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

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

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

Answer: B

Watch Video Solution

Archives (JEE Advanced)

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

Answer: B

Watch Video Solution

Archives (Multiple correct answer type)

1. 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 option(s) is(are)

A. $\cos\beta > 0$

B. $\sin\beta < 0$

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

D. $\cos\alpha < 0$

Answer: B::C::D

Watch Video Solution

2. For any positive integer n, define $f_n : (0, \infty) \to R$ as $f_n(x) = \sum_{j=1}^{n} \tan^{-1}\left(\frac{1}{1 + (x + j)(x + j - 1)}\right)$ for all $x \in (0, \infty)$. Here, the inverse trigonometric function $\tan^{-1} x$ assumes values in

$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. Then, which of the following statement(s) is (are) TRUE? $\sum_{j=1}^{5} \tan^2\left(f_j(0)\right) = 55$ (b) $\sum_{j=1}^{10} (1 + fj'(0))\sec^2\left(f_j(0)\right) = 10$ (c) For any fixed positive integer n , $(\lim)_{x \to \infty} \tan(f_n(x)) = \frac{1}{n}$ (d) For any fixed positive integer n , $(\lim)_{x \to \infty} \sec^2(f_n(x)) = 1$

A. $\sum_{j=1}^{5} \tan^2\left(f_j(0)\right) = 55$

B. $\sum_{j=1}^{10} \left(1 + f'_j(0)\right)\sec^2\left(f_j(0)\right) = 10$

C. For any fixed positive inetger n, $\lim_{x \to \infty} \tan(f_n(x)) = \frac{1}{n}$

D. For any fixed positive integer n, $\lim_{x \to \infty} \sec^2(f_n(x)) = 1$

Answer: A::B::D

Watch Video Solution

Archives (Numerical Value type)

1. Let $f: [0, 4\pi]\overrightarrow{0, \pi}$ be defined by $f(x) = \cos^{-1}(\cos x)$. The number of points $x \in [0, 4\pi] satiy \in \ > he$ equation $f(x) = \frac{10 - x}{10}$ is____

Watch Video Solution

2. The number of real solution of the equation $\tan^{-1}\sqrt{x^2-3x+2}+\cos^{-1}\sqrt{4x-x^2-3}=\pi$ is

Watch Video Solution

SINGLE CORRECT ANSWER TYPE

1. The values of x which satisfy $18\left(\sin^{-1}x\right)^2-9\pi\sin^{-1}x+\pi^2<0$ and $18\left(\tan^{-1}x\right)^2-9\pi\tan^{-1}x+\pi^2<0$ simultaneously are

A. $\left(\frac{\sqrt{3}}{3},\frac{\sqrt{3}}{2}\right)$

B. $\left(\frac{\sqrt{3}}{2},1\right)$

C. $\left(\frac{1}{3},\frac{\sqrt{3}}{2}\right)$

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

Answer: A

View Text Solution

2. If $f(x) = \sin^{-1}(\cos ec(\sin^{-1} x)) + \cos^{-1}(\sec(\cos^{-1} x))$, then f(x) takes

A. exactly two values

B. one value

C. undefined

D. infinite values

Answer: B

View Text Solution

3. The set of all real values of x satisfying $\sin^{-1}\sqrt{x} < \frac{\pi}{4}$, is

A. $\left(0, \frac{1}{2}\right)$

B. $\left[0, \frac{1}{2}\right)$

C. $\left(0, \frac{1}{2}\right]$

D. $\left[0, \frac{1}{2}\right]$

Answer: B

View Text Solution

4. The number of ordered triplets (x, y, z) satisfy the equation $\left(\sin^{-1} x\right)^2 = \frac{\pi^2}{4} + \left(\sec^{-1} y\right)^2 + \left(\tan^{-1} z\right)^2$

A. 2

B. 4

C. 6

D. 8

Answer: A

View Text Solution

5. The range of function $f(x) = \sin^{-1}(x - \sqrt{x})$ is equal to

A. $\left[\sin^{-1}\frac{1}{4}, \frac{\pi}{2}\right]$

B. $\left[\sin^{-1}, \frac{\pi}{2}\right]$

C. $\left[-\sin^{-1}\frac{1}{4}, \frac{\pi}{2}\right]$

D. $\left[-\sin^{-1}\frac{1}{2}, \frac{\pi}{2}\right]$

Answer: C

View Text Solution

6. The number of solution of the equation $\left|\tan^{-1}|x|\right| = \sqrt{(x^2+1)^2 - 4x^2}$ is

A. 2

B. 3

C. 4

D. none of these

Answer: C

View Text Solution

7. The number of solutions of the equation $\sin^{-1}|x| = |\cos^{-1} x|$ are

A. 0

B. 1

C. 2

D. 3

Answer: B

View Text Solution

8. For $x \in (0, 1)$, let $\alpha = \sin^{-1} x, \beta = x, \gamma = \tan^{-1} x, \delta = \cot^{-1} x - \frac{\pi}{2}$. Which of the following is true ?

A. $\alpha > \beta > \gamma$

B. $\beta > \alpha > \gamma > \delta$

C. $\alpha > \beta > \gamma > \delta$

D. $\beta > \alpha > \delta > \gamma$

Answer: C

View Text Solution

9. If $x, y, z \in$ R are such that they satisfy x + y + z = 1 and $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{4}$, then the value of $|x^3 + y^3 + z^3 - 3|$ is

A. 1.5

B. 2

C. 2.5

D. 3

Answer: B

View Text Solution

10. The complete set of values of a for which the function $f(x) = \tan^{-1}(x^2 - 18x + a) > 0 \forall x \in R$ is

A. $(81, \infty)$

B. $[81, \infty)$

C. $(-\infty, 81)$

D. $(-\infty, 81]$

Answer: A

View Text Solution

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

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

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

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

D. none of these

Answer: C

Watch Video Solution

12. The value of $\sec\left(\sin^{-1}\left(\sin\left(\frac{-50\pi}{9}\right)\right)+\cos^{-1}\left(\frac{\cos(31\pi)}{9}\right)\right)$

A. sec. $\frac{10\pi}{9}$

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

C. 1

D. -1

Answer: D

View Text Solution

13. Find the principal values of $\sin^{-1}\sin\left(\frac{3\pi}{4}\right)$

Watch Video Solution

14. Find the principal values of $\tan^{-1}\tan\left(\frac{3\pi}{4}\right)$

Watch Video Solution

15. Evaluate: $\sin\left(\frac{1}{4}\sin^{-1}\left(\frac{\sqrt{63}}{8}\right)\right)is$

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

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

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

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

Answer: C

View Text Solution

16. Find the principal values of $\cos^{-1}\cos\left(\frac{7\pi}{6}\right)$

Watch Video Solution

17. Find the principal values of $\sin\cos^{-1}\left(-\frac{1}{2}\right)$

Watch Video Solution

18. Find the principal values of $\cos^{-1}\left(\frac{1}{2}\right)$

Watch Video Solution

19. Find the principal values of $\tan^{-1}(1)$

Watch Video Solution

20. Find the principal values of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

Watch Video Solution

21. The sum of all possible values of x satisfying the equation $\sin^{-1}(3x-4x^3)+\cos^{-1}(4x^3-3x)=\frac{\pi}{2}$ is

A. -2

B. -1

C. 1

D. 0

Answer: D

Watch Video Solution

22. If $2\tan^{-1}x = \sin^{-1}K$ then the value of k is

A. $\pi/2$

B. π

C. 2π

D. 3π

Answer: C

Watch Video Solution

23. If the function $f(x) = \sin^{-1}x + \cos^{-1}x$ and g(x) are identical, then g(x) can be equal to

A. $\sin^{-1}|x| + |\cos^{-1}x|$

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

C. $\left|\sin^{-1}x\right| + \cos^{-1}|x|$

D. $\left(\sqrt{\sin^{-1}x}\right)^2 + \left(\sqrt{\cos^{-1}x}\right)^2$

Answer: C

Watch Video Solution

24. The value of x satisfying $\sin^{-1}\left(\sqrt{\frac{3x-1}{25}}\right) + \sin^{-1}\left(\sqrt{\frac{3x+1}{25}}\right) = \frac{\pi}{2}$ lies in the interval

A. (1,2)

B. (2,3)

C. (3,4)

D. (4,5)

Answer: D

Watch Video Solution

25. The set of values of k for which the equation $\sin^{-1} x + \cos^{-1} x + \pi(|x| - 2) = k\pi$ possesses real solution is [a,b] then the value of a + b is

A. 0

B. -2

C. -1

D. 2

Answer: B

Watch Video Solution

26. The soluation set of inequality $(\sin x + \cos^{-1} x) - (\cos x - \sin^{-1} x) \geq \frac{\pi}{2}$, is equal to

A. $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$

B. $\bigcup_{n \in I} \left[2n\pi + \frac{\pi}{4}, 2n\pi + \frac{5\pi}{4}\right]$

C. $\left[\frac{\pi}{4}, 1\right]$

D. $\left[-1, \frac{-\pi}{4}\right] \cup \left[\frac{\pi}{4}, 1\right]$

Answer: C

Watch Video Solution

27. The number of integral values in the range of the function $f(x) = \sin^{-1} x - \cot^{-1} x + x^2 + 2x + 6$ is

A. 10

B. 11

C. 12

D. 8

Answer: D

Watch Video Solution

28. $\cos^{-1}\sqrt{\frac{a-x}{a-b}} = \sin^{-1}\sqrt{\frac{x-b}{a-b}}$ is possible ,if

A. $a > x > b$

B. $a < x < b$

C. $a = x = b$

D. $a > b$ and x takes any value

Answer: A::B

Watch Video Solution

29. The value(s) of x satisfying $\tan^{-1}(x+3) - \tan^{-1}(x-3) = \sin^{-1}\left(\frac{3}{5}\right)$ may be

A. -2

B. -1

C. 0

D. 2

Answer: C

Watch Video Solution

30. If x and y are positive integer satisfying $\tan^{-1}\left(\frac{1}{x}\right)+\tan^{-1}\left(\frac{1}{y}\right)=\frac{1}{7}$, then the number of ordered pairs of (x,y) is

A. 3

B. 4

C. 5

D. 6

Answer: D

Watch Video Solution

31. The number of solution (s) of the equation $\sin^{-1}(1-x)-2\sin^{-1}x=\frac{\pi}{2}$ is/are

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

32. If $\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right)+\tan^{-1}\left(\frac{2x}{x^2-1}\right)=\frac{2\pi}{3}$, then x equal to (A) $\sqrt{3}$ (B) $2+\sqrt{3}$ (C) $2-\sqrt{3}$ (D) $-\sqrt{3}$

A. 2

B. $\sqrt{3}$

C. 4

D. 3

Answer: B

Watch Video Solution

33. The solution of $\sin^{-1}x - \sin^{-1}2x = \pm\frac{\pi}{3}$ is

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

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

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

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

Answer: D

Watch Video Solution

34. If $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+\sin^{-1}\left(\frac{2x}{1+x^2}\right)=p$ for all $x \in [-1, 0]$, then p is equal to

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

B. 0

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

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

Answer: B

Watch Video Solution

35. Let $f(x)=\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and $g(x)=\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right)$. Then tha value of f(10)-g(100) is equal to

A. $\pi-2\left(\tan^{-1}(10)+\tan^{-1}(100)\right)$

B. 0

C. $2\left(\tan^{-1}(100)-\tan^{-1}(10)\right)$

D. $2\left(\tan^{-1}(10) - \tan^{-1}(100)\right)$

Answer: C

Watch Video Solution

36. Solve $\tan^{-1}x + \cot^{-1}(-|x|) = 2\tan^{-1}6x$

A. 4

B. 3

C. 2

D. 1

Answer: C

Watch Video Solution

37. Solve: $\dfrac{\sin^{-1}(3x)}{5} + \dfrac{\sin^{-1}(4x)}{5} = \sin^{-1}x$

A. 0

B. 1

C. 2

D. 3

Answer: D

Watch Video Solution

38. If $x \in \left[-1, \frac{-1}{\sqrt{2}}\right]$, then the inverse of the function $f(x) = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is given by

A. $-\cos.\ \frac{y}{2}$

B. $\cos.\ \frac{y}{2}$

C. $-2\cos y$

D. $-2\cos y$

Answer: A

Watch Video Solution

39. The expression $\sum_{n=1}^{\infty} \cot^{-1}(n^2 - 3n + 3)$ simplifies to

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

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

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

D. π

Answer: C

Watch Video Solution

40. The value of sum $\sum_{n=1}^{\infty} \cot^{-1}\left(\frac{(n^2 + 2n)(n^2 + 2n + 1) + 1}{2n + 2}\right)$ is equal to

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

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

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

D. $\cot^{-1}(1)$

Answer: C

Watch Video Solution

41. The number of solution of the equation $2\sin^{-1}\left(\frac{2x}{1+x^2}\right) - \pi x^3 = 0$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: D

Watch Video Solution

Multiple Correct Answers Type

1. Let $f(x) = \cos^{-1}\left(\dfrac{1 - \frac{\tan^2(x)}{2}}{1 + \frac{\tan^2(x)}{2}}\right)$. Then which of the following statement is/are true ?

A. Ranges of f(x) is $[0, \pi)$

B. $f(x) = \pi$ has infinite roots

C. y = f(x) is identical with $y = \cos^{-1}(\cos x)$

D. y = f(x) has period 2π

Answer: A::D

View Text Solution

2. If $f(x) = \sin^{-1}(\sin x), g(x) = \cos^{-1}(\cos x)$ and $h(x) = \cot^{-1}(\cot x)$, then which of the following is/are correct ?

A. (a) $f(x) = g(x) = h(x) \forall x \in \left(\frac{\pi}{4}, \frac{\pi}{3}\right)$

B. (b) $f(x) < g(x) < h(x) \forall x \in \left(\frac{\pi}{2}, \pi\right)$

C. (c) $h(x) > g(x) > f(x) \forall x \in \left(\frac{3\pi}{2}, 2\pi\right)$

D. (d) $f(x) > g(x)$ has no real solution

Answer: A::C::D

View Text Solution

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

A. maximum value of $x^2 + y^2$ is $\frac{49}{3}$

B. maximum value of $x^2 + y^2$ is 4

C. minimum value of $x^2 + y^2$ is $\frac{1}{3}$

D. minimum value of $x^2 + y^2$ is 3

Answer: A::C::D

Watch Video Solution

Watch Video Solution

4. Solve the following equations: $\sin\left[2\cos^{-1}\left\{\cot\left(2\tan^{-1}x\right\}\right]=0$

A. ± 1

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

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

D. $\pm\sqrt{2}$

Answer: A::B::C

Watch Video Solution

5. Let x_1, x_2, x_3, x_4 be four non zero numbers satisfying the equation $\tan^{-1}\left(\frac{a}{x}\right)+\tan^{-1}\left(\frac{b}{x}\right)+\tan^{-1}\left(\frac{c}{x}\right)+\tan^{-1}\left(\frac{d}{x}\right)=\frac{\pi}{2}$ then which ofthe following relation(s) hold good?

A. $x_1+x_2+x_3+x_4=a+b+c+d$

B. $\frac{1}{x_1}+\frac{1}{x_2}+\frac{1}{x_3}+\frac{1}{x_4}=0$

C. $x_1x_2x_3x_4=abcd$

D. $(x_2+x_3+x_4)(x_3+x_4+x_1)(x_1+x_2+x_3)=abcd$

Answer: B::C::D

Watch Video Solution

6. Which of the following is/are true ?

A. $\tan^{-1}\frac{1}{3}=\frac{1}{2}\sin^{-1}\frac{3}{5}$

B. $\tan^{-1}\frac{1}{3}=\frac{\pi}{4}-\cot^{-1}2$

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

D. $\tan^{-1}\frac{1}{3}=\frac{\pi}{2}-\cot^{-1}3$

Answer: A::B::C

Watch Video Solution

Comprehension Type

1. $f(x) = \sin^{-1} x + |\sin^{-1} x| + \sin^{-1}|x|$ no. of solution of equation f(x)=x is (a) 1 (b) 0 (c) 2 (d) 3

A. 1

B. 0

C. 2

D. 3

Answer: A

View Text Solution

2. Let $f(x) = \sin^{-1} x + |\sin^{-1} x| + \sin^{-1}|x|$ The range of f(x) is (a) $\left[0, \frac{\pi}{2}\right]$ (b) $\left[0, \frac{3\pi}{2}\right]$ (c) $\left[0, \frac{\pi}{4}\right]$ (d) $[0, \pi]$

A. $\left[0, \frac{\pi}{2}\right]$

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

C. $\left[0, \frac{\pi}{4}\right]$

D. $[0, \pi]$

Answer: B

View Text Solution

3. Let $f(x) = \sin^{-1} x + \left|\sin^{-1} x\right| + \sin^{-1}|x|$ If the equation f(x) = k has two solutions, then true set of values of k is

A. $k \in \left(0, \frac{\pi}{2}\right)$

B. $k \in \left[0, \frac{\pi}{2}\right]$

C. $k \in \left(0, \frac{\pi}{2}\right]$

D. $k \in \left[0, \frac{\pi}{2}\right)$

Answer: C

Watch Video Solution