MATHS

BOOKS - MODERN PUBLICATION

INVERSE-TRIGONOMETRIC FUNCTIONS

Example

1. The Principal value of $\sin^{-1}\left(\dfrac{1}{2}\right)$ is

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2. What is the principal value of $\cos^{-1}\left(\cos\dfrac{2\pi}{3}\right) + \sin^{-1}\left(\sin\dfrac{2\pi}{3}\right)$?

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3. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to :

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

5. Find domain for, $f(x) = \cos^{-1}x.$

6. Find the principal value of $\sin^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$

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

8. Find the principal value of $\cos^{-1}\left(-\dfrac{1}{2}\right)$

9. Find the principal value of following

$\cos^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$

10. Find the principal value of $\cos^{-1}\left(-\dfrac{1}{\sqrt{2}}\right)$

11. Find the principal values of the following:

$$\tan^{-1}\left(-\sqrt{3}\right)$$

12. Find the principal value of following

$$\tan^{-1}(-1)$$

13. Find the principal value of $\cot^{-1}\left(-\dfrac{1}{\sqrt{3}}\right)$

14. Find the principal value of $\cot^{-1}\left(\sqrt{3}\right)$

15. Find the principal values of the following (2-8):

$$\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$$

16. Find the principal value of following

$$\sec^{-1}(-2)$$

17. Find the principal values of the following (2-8):

$$\cos ec^{-1}(2)$$

18. Find the principal values of the following (2-8):

$$\cos ec^{-1}(-\sqrt{2})$$

19. Find the principal values of the following (2-8):

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

20. Find the principal values of the following (2-8):

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

21. Find the principal values of the following (2-8):

$$\sin^{-1}\left(\frac{\sin(3\pi)}{5}\right)$$

22. Find the principal values of the following (2-8):

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

23. Find the principal values of the following (2-8):

$$\cos\left(\sin^{-1}\left(\frac{5}{13}\right)\right)$$

24. Find the vlaue of $\sin^{-1}\left(-\frac{1}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)$

25. Write the principle value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right)$.

26. Write the principle value of :

$$\tan^{-1}\left(\sqrt{3}\right) - \cot^{-1}\left(-\sqrt{3}\right)$$

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27. Find the principal value of following

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

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28. Find the value of $\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$.

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29. Find the principal value of following

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

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30. Write the value of $\tan 6 - 1 \left[2 \sin \left(2 \cos^{-1} \left(\frac{\sqrt{3}}{2} \right) \right) \right]$

31. If $\sin^{-1} \left(\frac{1}{3} \right) + \cos^{-1} x = \frac{\pi}{2}$. Find x.

32. If $\sec^{-1}(2) + \cos ec^{-1}(y) = \frac{\pi}{2}$, then find y.

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

34. Prove the following :

$$\cos\left(\frac{\sin^{-1}3}{5} + \frac{\cot^{-1}3}{2}\right) = \frac{6}{5\sqrt{13}}$$

35. If `tan^-1 x + tan^-1y = pi/4, xy < 1, then write the value of x +y + xy.

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

37. Prove that : $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$

38. prove that $\dfrac{\sin^{-1}3}{5} - \dfrac{\sin^{-1}8}{17} = \dfrac{\cos^{-1}84}{85}$

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39. Show that $2\sin^{-1}\left(\dfrac{3}{5}\right) - \tan^{-1}\left(\dfrac{17}{31}\right) = \dfrac{\pi}{4}$

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40. Show that : $\dfrac{9\pi}{8} - \dfrac{9}{4}\sin^{-1}\left(\dfrac{1}{3}\right) = \dfrac{9}{4}\sin^{-1}\left(\dfrac{2\sqrt{2}}{3}\right)$

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41. Prove that :

$\tan^{-1}\left(\dfrac{6x - 8x^3}{1 - 12x^2}\right) - \tan^{-1}\left(4\dfrac{x}{1 - 4x^2}\right) = \tan^{-1}2x, |2x| < \dfrac{1}{\sqrt{3}}$

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42. <div align="center">Prove</div> that

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

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

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44. If $\tan^{-1}\left(\frac{x-2}{x-4}\right) + \tan^{-1}\left(\frac{x+2}{x+4}\right) = \frac{\pi}{4}$ find the value of 'x'.

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45. Solve the following equations

$$\tan^{-1}\frac{x}{2} + \tan^{-1}\frac{x}{3} = \frac{\pi}{4}, \sqrt{6} > x > 0$$

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46. Solve for x : $\left(\tan^{-1} x\right)^2 + \left(\cot^{-1} x\right)^2 = \dfrac{5\pi^2}{8}$

47. Solve for x :

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

48. Write $\tan^{-1}\left(\dfrac{1}{\sqrt{x^2 - 1}}\right)$, $|x| > 1$ in simplest form.

49. Prove that : $\tan^{-1}\left(\dfrac{\cos x}{1 + \sin x}\right) = \dfrac{\pi}{4} - \dfrac{x}{2}, x \in \left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

50. Prove that $\tan^{-1} x + \tan^{-1} \dfrac{2x}{1 - x^2} = \tan^{-1}\left(\dfrac{3x - x^3}{1 - 3x^2}\right), |x| < 1$

51. Simplifty : $\tan^{-1}\left[\dfrac{a \cos x - b \sin x}{b \cos x + a \sin x}\right]$ if $\dfrac{a}{b}\tan x > -1$

52. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, then prove that: x + y + z = xyz.

53. Prove that : $\tan^{-1}\left[\dfrac{\sqrt{1 + x} - \sqrt{1 - x}}{\sqrt{1 + x} + \sqrt{1 - x}}\right] = \dfrac{\pi}{4} - \dfrac{1}{2}\cos^{-1} x$

54. Prove the following: $\cos\left[\tan^{-1}\left\{\sin\left(\cot^{-1}x\right)\right\}\right] = \sqrt{\dfrac{1+x^2}{2+x^2}}$

55. Is $\sec^{-1}(-x) = \pi - \sec^{-1}x$, $|x| \geq 1$? State True/False.

56. Find the value of the following

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

57. Find the value of the following

$\sin^{-1}\left(\dfrac{\sin(3\pi)}{5}\right)$

58. Find the value of the following

$$\sin^{-1}\left(\frac{\sin(4\pi)}{5}\right)$$

59. Find the value of the following

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

60. Find the value of the following

$$\tan^{-1}\left(\frac{\tan(7\pi)}{6}\right)$$

61. Find the value of the following

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

62. Find the value of the following

$$\cos\left(\sec^{-1}x + \cos ec^{-1}x\right), |x| > 1$$

63. Write down the value of $\cos ec^{-1}x + \sec^{-1}x$, where $|x| \geq 1$

64. Evaluate:$\tan^{-1}1 + \cos^{-1}\left(\frac{1}{2}\right) + \sin^{-1}\left(\frac{1}{2}\right)$

65. Prove that : $2\sin^{-1}\left(\dfrac{3}{5}\right) = \tan^{-1}\left(\dfrac{24}{7}\right)$

66. Prove that : $\tan\left(\left(\dfrac{1}{2}\right)\sin^{-1}\left(\dfrac{3}{4}\right)\right) = \dfrac{4-\sqrt{7}}{3}$

67. Prove that : $\cos^{-1}\left(\cos^2 x - \sin^2 x\right) = 2x$

68. Find the values of x : $2\sin x = 1$

69. Prove that $3\cos^{-1}x = \cos^{-1}(4x^3 - 3x),\ x \in \left[\dfrac{1}{2}, 1\right]$

70. Show that : $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}x,\ -\dfrac{1}{\sqrt{2}} \le x \le \dfrac{1}{\sqrt{2}}$

71. Show that : $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\cos^{-1}x,\ \dfrac{1}{\sqrt{2}} \le x \le 1$

72. $2\tan^{-1}x = \sin^{-1}\dfrac{2x}{1+x^2},\ |x| \le 1.$

73. Prove that : $\tan^{-1}\left(\dfrac{2x\sqrt{1-x^2}}{1-2x^2}\right) = 2\sin^{-1}x$ when:

$$\dfrac{1}{\sqrt{2}} \le x \le \dfrac{1}{\sqrt{2}}$$

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74. Prove that $\tan^{-1}\sqrt{x} = \dfrac{1}{2}\cos^{-1}\left(\dfrac{1-x}{1+x}\right)$, $x \in [0, 1]$

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75. Prove that : $\tan^{-1}\left(\dfrac{1-x}{1+x}\right) = \dfrac{\pi}{4} - \tan^{-1}x$

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76. Prove that $\sin^{-1}\left(\dfrac{4}{5}\right) + \sin^{-1}\left(\dfrac{5}{13}\right) + \sin^{-1}\left(\dfrac{16}{65}\right) = \dfrac{\pi}{2}$.

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77. Show that $\sin^{-1}\left(\dfrac{12}{13}\right) + \cos^{-1}\left(\dfrac{4}{5}\right) + \tan^{-1}\left(\dfrac{63}{16}\right) = \pi$

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78. Prove that : $2\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{7}\right) = \tan^{-1}\left(\dfrac{31}{17}\right)$

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79. Prove that : $2\tan^{-1}\left(\dfrac{1}{5}\right) + \tan^{-1}\left(\dfrac{1}{4}\right) = \tan^{-1}\left(\dfrac{32}{43}\right)$

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80. Prove that : $2\tan^{-1}\left(\dfrac{1}{5}\right) + \tan^{-1}\left(\dfrac{1}{6}\right) = \tan^{-1}\left(\dfrac{42}{67}\right)$

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81. Prove that : $2\tan^{-1}\left(\dfrac{1}{7}\right) + \tan^{-1}\left(\dfrac{1}{3}\right) = \tan^{-1}\left(\dfrac{9}{13}\right)$

82. Prove that : $\tan^{-1}\left(\dfrac{3}{4}\right) + \tan^{-1}\left(\dfrac{3}{5}\right) - \tan^{-1}\left(\dfrac{8}{19}\right) = \dfrac{\pi}{4}$

83. Prove that :

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

84. Prove that :

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

85. Prove that : $\cos^{-1}\left(\dfrac{4}{5}\right) + \cos^{-1}\left(\dfrac{12}{13}\right) = \cos^{-1}\left(\dfrac{33}{65}\right)$

86. Prove that : $\cos^{-1}\left(\dfrac{12}{13}\right) + \sin^{-1}\left(\dfrac{3}{5}\right) = \cos^{-1}\left(\dfrac{33}{65}\right)$

87. Prove that

$$\sin^{-1}\dfrac{5}{13} + \cos^{-1}\dfrac{3}{5} = \sin^{-1}\dfrac{63}{65}$$

88. Prove that

$$\tan^{-1}\dfrac{63}{16} = \sin^{-1}\dfrac{5}{13} + \cos^{-1}\dfrac{3}{5}$$

89. Prove that : $\sin^{-1}\left(\dfrac{8}{17}\right) + \sin^{-1}\left(\dfrac{3}{5}\right) = \sin^{-1}\left(\dfrac{77}{85}\right)$

90. Prove that : $\sin^{-1}\dfrac{3}{5} + \sin^{-1}\dfrac{8}{17} = \cos^{-1}\dfrac{36}{85}.$

91. Prove that : $\sin^{-1}\left(\dfrac{3}{5}\right) + \cos^{-1}\left(\dfrac{12}{13}\right) = \sin^{-1}\left(\dfrac{56}{65}\right)$

92. Show that $\sin^{-1}\dfrac{3}{5} - \sin^{-1}\dfrac{8}{17} = \cos^{-1}\dfrac{84}{85}$

93. Prove that : $\cos^{-1}\left(\dfrac{4}{5}\right) + \tan^{-1}\left(\dfrac{3}{5}\right) = \tan^{-1}\left(\dfrac{27}{11}\right)$

94. Prove that

$$\tan^{-1}\frac{63}{16} = \sin^{-1}\frac{5}{13} + \cos^{-1}\frac{3}{5}$$

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95. Find the value of : $4\left(2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right)\right)$

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96. Find the value $2\tan^{-1}\left(\frac{1}{5}\right) + \sec^{-1}\left(\frac{5\sqrt{2}}{7}\right) + 2\tan^{-1}\left(\frac{1}{8}\right)$

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97. $\cot^{-1}\frac{ab+1}{a-b} + \cot^{-1}\frac{bc+1}{b-c} + \cot^{-1}\frac{ca+1}{c-a} = 0$

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98. Find the value of the following:

$$\frac{\tan 1}{2}\left[\sin^{-1}\left(2\frac{x}{1+x^2}\right) + \frac{\cos^{-1}(1-y^2)}{1+y^2}\right], \ |x| < 1, y > 0 \qquad xy < 1$$

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99. If $\cos\left(\sin^{-1}\frac{2}{3} + \cos^{-1}x\right) = 0$, then find the value of x.

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100. Solve the following equations:

$$\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}, \ x > 0$$

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101. Solve the following equations:

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

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102. Solve the following equations:

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

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103. Solve the following equations:

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

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104. Solve the following equations:

$$2\tan^{-1}(\sin x) = \tan^{-1}(2\sec x), \ x \neq \frac{\pi}{2}$$

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105. Solve the following equations:

$$\tan^{-1}(x+2) + \tan^{-1}(x-2) = \tan^{-1}\left(\frac{8}{79}\right), \, x > 0$$

106. Solve the following equations:

$$\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{8}{31}\right), \, x > 0$$

107. Solve the following equations:

$$\tan^{-1}(x+2) + \tan^{-1}(x-2) = \frac{\pi}{4}, \, x > 0$$

108. Solve the following equations:

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

109. Solve the following equations:

$$\tan^{-1}\left(\frac{2x}{1-x^2}\right) + \cot^{-1}\left(\frac{1-x^2}{2x}\right) = \frac{\pi}{3}, x > 0$$

110. find the value of x:

$$2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$$

111. find the value of x:

$$\cos\left(\tan^{-1}x\right) = \sin\left(\frac{\cot^{-1}(3)}{4}\right)$$

112. If $\sin\left[\cot^{-1}(x+1)\right] = \cos\left(\tan^{-1}x\right)$, then find x.

113. find the value of x:

$$2\tan^{-1}(\sin x) = \tan^{-1}(2\sec x), 0 < x < \frac{\pi}{2}$$

114. Solve for x,

$$\tan^{-1}(x+1) + \tan^{-1}x + \tan^{-1}(x-1) = \tan^{-1}3$$

115. Write the following in the simplest form:

$$\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right), x < \pi$$

116. Write the following in the simplest form:

$$\tan^{-1}\left(\frac{\cos x}{1 - \sin x}\right), \quad -\frac{\pi}{2} < x < \frac{\pi}{2}$$

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117. Write the following in the simplest form:

$$\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right), \quad x < \pi$$

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118. Write the following function in the simplest form: `tan^-1 (x/sqrt(a^2 - x^2)), |x|`

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119. Write the following function in the simplest form:

$$\tan^{-1}\left(\frac{\sqrt{1 + x^2} - 1}{x}\right), \quad x \neq 0$$

120. Write the following function in the simplest form :

$$\tan^{-1}\left(\frac{1}{\sqrt{x^2 - 1}}\right), \, |x| > 1$$

121. Prove that $\tan^{-1}\left(\dfrac{\sqrt{1 - x^2}}{1 + x}\right) = \dfrac{1}{2}\cos^{-1} x$

122. Prove that : $\dfrac{1}{2}\tan^{-1} x = \cos^{-1}\left\{\dfrac{1 + \sqrt{1 + x^2}}{2\sqrt{1 + x^2}}\right\}^{\frac{1}{2}}$

123. Prove that : $\tan^{-1}\left[\dfrac{\sqrt{1+z}+\sqrt{1-z}}{\sqrt{1+z}-\sqrt{1-z}}\right] = \dfrac{\pi}{4} + \dfrac{1}{2}\cos^{-1}z$

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124. Prove that : $\tan^{-1}\left[\dfrac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right] = \dfrac{\pi}{4} - \dfrac{1}{2}\cos^{-1}x^2$

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

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

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127. Prove that $\cos\left(\tan^{-1}\left(\sin\left(\cot^{-1}x\right)\right)\right) = \sqrt{\dfrac{x^2+1}{x^2+2}}$

128. If $\tan^{-1}\left(\dfrac{yz}{xr}\right) + \tan^{-1}\left(\dfrac{zx}{yr}\right) + \tan^{-1}\left(\dfrac{xy}{zr}\right) = \dfrac{\pi}{2}$, prove that $x^2 + y^2 + z^2 = r^2$

129. If $\cos^{-1}\dfrac{x}{a} + \cos^{-1}\dfrac{y}{b} = \alpha$, prove that : $\dfrac{x^2}{a^2} - \dfrac{2xy}{ab}\cos\alpha + \dfrac{y^2}{b^2} = \sin^2\alpha$

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

131. Find the principal values of the following:

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

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132. Find the principal values of the following:

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

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133. Find the principal values of the following (2-8):

$$\cos ec^{-1}(2)$$

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134. Find the principal values of the following:

$$\tan^{-1}\left(-\sqrt{3}\right)$$

135. Find the principal values of the following:

$$\cos^{-1}\left(-\frac{1}{2}\right)$$

136. Find the principal values of the following:

$$\tan^{-1}(1)$$

137. Find the principal values of the following (2-8):

$$\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$$

138. Find the principal values of the following:

$\cot^{-1}\left(\sqrt{3}\right)$

139. Find the principal values of the following:

$\cos^{-1}\left(-\dfrac{1}{\sqrt{2}}\right)$

140. Find the principal values of the following (2-8):

$\cos ec^{-1}\left(-\sqrt{2}\right)$

141. Find the values of the following

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

142. Find the values of the following

$$\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$$

143. If $\sin^{-1} x = y$, then:

A. $0 \le y \le \pi$

B. $-\dfrac{\pi}{2} \le y \le \dfrac{\pi}{2}$

C. $0 < y < \pi$

D. $-\dfrac{\pi}{2} < y < \dfrac{\pi}{2}$

Answer:

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144. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to :

A. π

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

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

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

Answer:

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145. Prove the following: $3\sin^{-}1x = \sin^{-}1(3x-4x^3)$, $x \in \left[-\dfrac{1}{2}, \dfrac{1}{2}\right]$

146. Prove the following: $3\cos^{-1}x = \cos^{-1}(4x^3 - 3x)$, $x \in \left[\dfrac{1}{2}, 1\right]$

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147. Prove the following: $\tan^{-1}\left(\dfrac{2}{11}\right) + \tan^{-1}\left(\dfrac{7}{24}\right) = \tan^{-1}\left(\dfrac{1}{2}\right)$

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148. Prove that : $2\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{7}\right) = \tan^{-1}\left(\dfrac{31}{17}\right)$

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149. Write the following function in the simplest form: $\tan^{-1}\left(\dfrac{\sqrt{1+x^2}-1}{x}\right)$, $x \neq 0$

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150. Write the following function in the simplest form :

$$\tan^{-1}\left(\frac{1}{\sqrt{x^2 - 1}}\right), |x| > 1$$

151. Write in simplest form : $\tan^{-1}\left(\sqrt{\dfrac{1 - \cos x}{1 + \cos x}}\right), x < \pi.$

152. Write the following in the simplest form:

$$\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right), x < \pi$$

153. Write the following function in the simplest form: `tan^-1 (x/sqrt(a^2 - x^2)), |x|

154. Write the following function in the simplest form : `tan^-1 ((3a^2 x - x^3)/(a^3 - 3ax^2)), a>0, -a/sqrt3

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

156. The value of $\cot\left(\tan^{-1}x + \cot^{-1}x\right)$ is equal to :

157. Find the value of the following:

$$\frac{\tan 1}{2}\left[\sin^{-1}\left(2\frac{x}{1+x^2}\right) + \frac{\cos^{-1}(1-y^2)}{1+y^2}\right], |x| < 1, y > 0 \qquad xy < 1$$

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

159. If $\tan^{-1}\left(\dfrac{x-1}{x-2}\right) + \tan\left(\dfrac{x+1}{x+2}\right) = \dfrac{\pi}{4}$, then find the value of 'x'.

160. Find the values of each of the expressions

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

161. Find the values of each of the expressions

$$\tan^{-1}\left(\tan\left(\dfrac{3\pi}{4}\right)\right)$$

162. Find the values of each of the expressions

$$\tan\left(\sin^{-1}\left(\frac{3}{5}\right) + \cot^{-1}\left(\frac{3}{2}\right)\right)$$

163. Find the values of each of the expressions

$$\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$$ is equal to

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

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

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

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

Answer:

164. $\sin\left(\dfrac{\pi}{3} - \sin^{-1}\left(-\dfrac{1}{2}\right)\right)$ is equal to

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

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

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

D. 1

Answer:

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165. $\tan^{-1}\left(\sqrt{3}\right) - \cot^{-1}\left(-\sqrt{3}\right)$ is equal to

A. π

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

C. 0

D. $2\sqrt{3}$

Answer:

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166. Find the value of the following:

$$\cos^{-1}\left(\cos\left(\frac{13\pi}{6}\right)\right)$$

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167. Find the value of the following: $\tan^{-1}\left(\tan\left(7\frac{\pi}{6}\right)\right)$

---

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

169. Prove that : $\sin^{-1}\left(\dfrac{8}{17}\right) + \sin^{-1}\left(\dfrac{3}{5}\right) = \tan^{-1}\left(\dfrac{77}{36}\right)$

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170. Prove that : $\cos^{-1}\left(\dfrac{4}{5}\right) + \cos^{-1}\left(\dfrac{12}{13}\right) = \cos^{-1}\left(\dfrac{33}{65}\right)$

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171. Prove that : $\sin^{-1}\left(\dfrac{12}{13}\right) + \cos^{-1}\left(\dfrac{3}{5}\right) = \sin^{-1}\left(\dfrac{56}{65}\right)$

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172. Prove that

$\tan^{-1}\dfrac{63}{16} = \sin^{-1}\dfrac{5}{13} + \cos^{-1}\dfrac{3}{5}$

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173. Prove that

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

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174. Prove that $\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), \ x \in [0, 1]$

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

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176. Prove that : $\tan^{-1}\left[\dfrac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right] = \dfrac{\pi}{4} - \dfrac{1}{2}\cos^{-1}x$

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177. Show that : $\dfrac{9\pi}{8} - \dfrac{9}{4}\sin^{-1}\left(\dfrac{1}{3}\right) = \dfrac{9}{4}\sin^{-1}\left(\dfrac{2\sqrt{2}}{3}\right)$

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

179. Solve the following equations:
$\tan^{-1}\left(\dfrac{1-x}{1+x}\right) = \dfrac{1}{2}\tan^{-1}x, \ x > 0$

180. $\sin\left(\tan^{-1}x\right), |x| < 1$ is equal to :

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

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

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

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

Answer:

181. If $\sin^{-1}(1-x) - 2\sin^{-1} x = \dfrac{\pi}{2}$, then x is equal to :

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

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

C. 0

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

Answer:

182. $\tan^{-1}\left(\dfrac{x}{y}\right) - \tan^{-1}\left(\dfrac{x-y}{x+y}\right)$ is equal to :

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

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

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

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

Answer:

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183. Prove that $\tan\left(\cot^{-1}x\right) = \cot\left(\tan^{-1}x\right)$. State with reason whether the equality is valid for all values of x.

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184. Find the value of $\tan\left(\cos^{-1} x\right)$ and hence evaluate $\tan\left(\cos^{-1}\left(\dfrac{8}{17}\right)\right)$

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185. Prove that $\cot^{-1} 7 + \cot^{-1} 18 + \cot^{-1} 118 = \cot^{-1} 3$.

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186. Find the value of $\sin\left(2\tan^{-1}\left(\dfrac{2}{3}\right)\right) + \cos\left(\tan^{-1}\sqrt{3}\right)$

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187. Domain of the function $f(x) = \tan^{-1} x$ is equal to :

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188. The Principal value of $\sin^{-1}\left(\dfrac{1}{2}\right)$ is

189. Write the principal value of $\tan^{-1}\left(\sqrt{3}\right) + \cos ec^{-1}\left(-2\right)$

190. If $\sec^{-1}\left(x\right) + \cos ec^{-1}\left(\dfrac{1}{3}\right) = \dfrac{\pi}{2}$, then find x.

191. Is $\cos^{-1}\left(-x\right) = \pi - \cos^{-1}x, x \in \left[-1, 1\right]$? (State True/False)

192. Find the value of $\sin\left(\sec^{-1}x + \cos ec^{-1}x\right), |x| > 1$

193. The value of $\tan^{-1} x + \cot^{-1} x$ is

194. Write down the value of $2\dfrac{\sin^{-1}(3)}{5}$

195. Solve the following equations:

$\tan^{-1} 2x + \tan^{-1} 3x = \dfrac{\pi}{4}, x > 0$

196. Is $\tan^{-1}\left(\sqrt{\dfrac{1 - x^2}{1 + x^2}}\right) = \dfrac{1}{2}\cos^{-1} x$ true?

Exercise

1. Find the value of $\cos^{-1}\left(\cos\left(\dfrac{3\pi}{2}\right)\right)$

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2. Evaluate: $\tan^{-1}\left\{\sin\left(-\dfrac{\pi}{2}\right)\right\}$

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3. Evaluate : $\sin^{-1}\left[\cos\left(\dfrac{\sin^{-1}\left(\sqrt{3}\right)}{2}\right)\right]$

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4. Find the value of $\sec\left(\tan^{-1}\left(\dfrac{y}{2}\right)\right)$ in terms of y.

5. Find the value of $\sin\left[2\cot^{-1}\left(\dfrac{5}{12}\right)\right]$

6. Which is greater $\tan 1$ or $\tan^{-1} 1$?

7. Evaluate : $\cos\left[\sin^{-1}\left(\dfrac{1}{4}\right) + \dfrac{\sec^{-1} 4}{3}\right]$

8. Find the value of the expression :

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

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

10. find the value of x:

$$\cos\left(\tan^{-1} x\right) = \sin\left(\frac{\cot^{-1}(3)}{4}\right)$$

11. Find the solution of the equation:

$$\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$$

12. Show that : $\sec\left(\cos ec^{-1}x\right) = \dfrac{|x|}{\sqrt{x^2 - 1}}$, for $|x| > 1$

13. Show that : $\cos\left(2\tan^{-1}x\right) = \dfrac{1 - x^2}{1 + x^2}$

14. Prove that : $\sin\left(\tan^{-1}1\right) = \dfrac{1}{\sqrt{2}}$

15. Prove that : $\cos ec\left[\tan^{-1}\left(-\sqrt{3}\right)\right] = -\dfrac{2}{\sqrt{3}}$

16. Solve : $3\tan^{-1}\left(\dfrac{1}{2+\sqrt{3}}\right) - \tan^{-1}\left(\dfrac{1}{x}\right) = \tan^{-1}\left(\dfrac{1}{3}\right)$

17. Solve : $\sin^{-1}\left(\dfrac{5}{x}\right) + \sin^{-1}\left(\dfrac{12}{x}\right) = \dfrac{\pi}{2}$

18. Show that $\sin^{-1}\left[\dfrac{\sin(3\pi)}{4}\right] \neq \dfrac{3\pi}{4}$. What is its value?

19. $\tan^{-1}\left[\dfrac{\tan(5\pi)}{6}\right] \neq \dfrac{5\pi}{6}$, What is its value?

20. Prove that : $\tan^{-1} x + \cot^{-1}(x+1) = \tan^{-1}\left(x^2 + x + 1\right)$

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21. Prove that : $\cot^{-1} 3 + \cos ec^{-1}\sqrt{5} = \dfrac{\pi}{4}$

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22. Prove that : $\sec^2\left(\tan^{-1} 2\right) + \cos ec^2\left(\cot^{-1} 3\right) = 15$

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23. If $\sin^{-1} x = y$, then

A. $0 \leq y \leq \pi$

B. $-\dfrac{\pi}{2} \leq y \leq \dfrac{\pi}{2}$

C. $0 < y < \pi$

D. $-\dfrac{\pi}{2} < y < \dfrac{\pi}{2}$

Answer:

24. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to :

A. π

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

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

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

Answer:

25. Find the values of each of the expressions

$$\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$$ is equal to

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

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

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

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

Answer:

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26. $\sin\left(\dfrac{\pi}{3} - \sin^{-1}\left(-\dfrac{1}{2}\right)\right)$ is equal to

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

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

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

D. 1

Answer:

27. $\tan^{-1}\sqrt{3} - \cot^{-1}\left(1 - \sqrt{3}\right)$ is equal to

28. $\sin\left(\tan^{-1} x\right), |x| < 1$ is equal to :

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

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

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

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

Answer:

29. If $\sin^{-1}(1 - x) - 2\sin^{-1}x = \dfrac{\pi}{2}$, then x is equal to :

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

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

C. 0

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

Answer:

30. $\tan^{-1}\left(\dfrac{x}{y}\right) - \tan^{-1}\left(\dfrac{x-y}{x+y}\right)$ is equal to :

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

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

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

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

Answer:

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31. The value of $\sin^{-1}\left(\cos\dfrac{43\pi}{5}\right)$ is

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

B. $\dfrac{-7\pi}{5}$

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

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

Answer:

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32. The principal value of the expression $\cos^{-1}[\cos(-680°)]$ is

A. $\dfrac{2\pi}{9}$

B. $\dfrac{-2\pi}{9}$

C. $\dfrac{34\pi}{9}$

D. $\dfrac{\pi}{9}$

Answer:

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33. The value of $\cot\left(\sin^{-1} x\right)$ is

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

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

C. $\dfrac{1}{x}$

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

Answer:

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34. The domain of $\sin^{-1} 2x$ is

A. $[0,1]$

B. $[-1,1]$

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

D. $[-2,2]$

Answer:

35. The greatest and least values of $\left(\sin^{-1} x\right)^2 + \left(\cos^{-1} x\right)^2$ are respectively:

A. $\dfrac{5\pi^2}{4}$ and $\dfrac{\pi^2}{8}$

B. $\dfrac{\pi}{2}$ and $-\dfrac{\pi}{2}$

C. $\dfrac{\pi^2}{4}$ and $\dfrac{-\pi^2}{4}$

D. $\dfrac{\pi^2}{4}$ and 0

Answer:

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36. If $\sin^{-1} x = y$, then:

A. $0 \leq y \leq \pi$

B. $-\dfrac{\pi}{2} \leq y \leq \dfrac{\pi}{2}$

C. $0 < y < \pi$

D. $-\dfrac{\pi}{2} < y < \dfrac{\pi}{2}$

Answer:

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37. Find the value of the following

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

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

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

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

D. None of these

Answer:

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38. Find the value of $\sin^{-1}\left(\sin\left(3\dfrac{\pi}{5}\right)\right)$

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

B. $-\dfrac{3\pi}{5}$

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

D. $-\dfrac{2\pi}{5}$

Answer:

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39. Principal value of `sin^-1 (-1/2)` is :

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

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

C. $-\dfrac{\pi}{6}$

D. $\dfrac{-5\pi}{6}$

Answer:

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40. Principal value of `cos^-1 (-1/2)` is :

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

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

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

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

Answer:

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41. If $\sec^{-1} x = \csc^{-1} y$, then find the value of $\cos^{-1}.\dfrac{1}{x} + \cos^{-1}.\dfrac{1}{y}$.

A. π

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

C. $\dfrac{5\pi}{6}$

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

Answer:

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

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

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

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

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

Answer:

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43. $\tan^{-1}\left(\dfrac{1}{\sqrt{3}}\right) - \sin^{-1}\left(\dfrac{1}{2}\right)$ is equal to :

A. 0

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

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

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

Answer:

---

44. $\sin\left(\dfrac{\pi}{3} - \sin^{-1}\left(-\dfrac{1}{2}\right)\right)$ is equal to

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

B. 1

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

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

Answer:

45. The principle value of $\dfrac{\cos^{-1}\left(-\sqrt{3}\right)}{2}$ is

A. 0

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

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

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

Answer:

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46. The value of $\sin^{-1}(\sin 160°)$ is

A. $160°$

B. $70°$

C. $-20°$

D. $20°$

Answer:

---

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

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

B. 0

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

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

Answer:

---

48. The principal value of $\sin^{-1}\left(\sin \dfrac{2\pi}{3} \right)$ is ....

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

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

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

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

Answer:

49. Range of function $\sin^{-1} x$ is :

A. [-1,1]

B. $\left[-\dfrac{\pi}{2}, \dfrac{\pi}{2} \right]$

C. (-1,1)

D. $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2} \right)$

Answer:

50. The principal value of $\cot^{-1}(-1)$ is

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

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

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

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

Answer:

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51. Range of function $\tan^{-1} x$ is :

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

B. $\left(0, \dfrac{\pi}{2}\right)$

C. $\left(-\dfrac{\pi}{2}, 0\right)$

D. $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

52. The value of $\cos\left\{\pi + \tan^{-1}\left(-\dfrac{1}{2}\right)\right\}$ is

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

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

C. $\dfrac{-\sqrt{3}}{2}$

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

53. $\cot^{-1}(21) + \cot^{-1}(13) + \cot^{-1}(8) =$

A. 0

B. $\cot^{-1} 26$

C. π

D. None of these

Answer:

54. $\tan\left(\cos^{-1}\left(\dfrac{1}{5\sqrt{2}}\right) - \sin^{-1}\left(\dfrac{4}{\sqrt{17}}\right)\right)$ is

A. A) $\dfrac{\sqrt{29}}{3}$

B. B) $\dfrac{29}{3}$

C. C) $\dfrac{\sqrt{3}}{29}$

D. D) $\dfrac{3}{29}$

Answer:

55. The value of $\sin^{-1}\left(\dfrac{2\sqrt{2}}{3}\right) + \sin^{-1}\left(\dfrac{1}{3}\right)$ is equal to

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

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

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

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

Answer:

56. Solve for x : $\tan^{-1}\dfrac{1-x}{1+x} = \dfrac{1}{2}\tan^{-1}x,\ x > 0.$

A. $\sqrt{3}$

B. 1

C. -1

D. $\dfrac{1}{\sqrt{3}}$

Answer:

57. The value of $\sin^{-1}\left(\dfrac{2\sqrt{2}}{3}\right) + \sin^{-1}\left(\dfrac{1}{3}\right)$ is equal to

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

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

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

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

Answer:

58. If $\cos^{-1}\left(\dfrac{1-a^2}{1+a^2}\right) - \cos^{-1}\left(\dfrac{1-b^2}{1+b^2}\right) = 2\tan^{-1}x$, then x is

A. $\dfrac{a}{1+ab}$

B. $\dfrac{a}{1-ab}$

C. $\dfrac{a-b}{a+ab}$

D. $\dfrac{a+b}{1+ab}$

Answer:

---

59. $\cos^{-1}\left(\cos\left(\dfrac{7\pi}{5}\right)\right)$ equals.

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

B. $\dfrac{2\pi}{5}$

C. $\dfrac{-7\pi}{5}$

D. $\dfrac{7\pi}{5}$

Answer:

60. The value of $\sec^2\left(\tan^{-1}3\right) + \cos ec^2\left(\cot^{-1}2\right)$ is

A. 5

B. 13

C. 15

D. 23

Answer:

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61. If $\sin^{-1}\left(\frac{x}{13}\right) + \cos ec^{-1}\left(\frac{13}{12}\right) = \frac{\pi}{2}$ then the value of x is

A. 5

B. 4

C. 12

D. 11

Answer:

---

62. Given $0 \leq x \leq \dfrac{1}{2}$, then the value of :

$$\tan\left[\sin^{-1}\left(\dfrac{x}{\sqrt{2}} + \dfrac{\sqrt{1 - x^2}}{\sqrt{2}}\right) - \sin^{-1} x\right] \text{ is}$$

A. 1) 1

B. 2) $\sqrt{3}$

C. 3) -1

D. 4) $\dfrac{1}{\sqrt{3}}$

Answer:

---

63. The value of $\sin\left(2\sin^{-1} 0.8\right)$ is equal to

A. 0.48

B. $\sin 1.2°$

C. $\sin 1.6°$

D. 0.96

Answer:

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64. The value of $\tan^{-1}\left(\dfrac{\sqrt{3}}{2}\right) + \tan^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$ is equal to

A. $\tan^{-1}\left(\dfrac{5}{\sqrt{3}}\right)$

B. $\tan^{-1}\left(\dfrac{2}{\sqrt{3}}\right)$

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

D. $\tan^{-1}\left(\dfrac{1}{3}\sqrt{3}\right)$

Answer:

65. The value of $\cos \left(\sin^{-1} \left(\dfrac{2}{3} \right) \right)$ is equal to

A. $\dfrac{\sqrt{5}}{3}$

B. $\dfrac{5}{3}$

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

D. $\sqrt{\dfrac{5}{3}}$

Answer:

66. If $\tan^{-1} 2x + \tan^{-1} 3x = \dfrac{\pi}{2}$, then the value of x is equal to

A. $\dfrac{1}{\sqrt{6}}$

B. $\dfrac{1}{6}$

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

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

Answer:

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67. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \dfrac{3\pi}{2}$, then the value of $x^9 + y^9 + z^9 - \dfrac{1}{x^9 y^9 z^9}$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer:

68. $2 \cos^{-1} x = \sin^{-1}\left(2x\sqrt{1 - x^2}\right)$ is valid for all value of x satisfying:

A. $0 \le x \le \dfrac{1}{\sqrt{2}}$

B. $-1 \le x \le 1$

C. $0 \le x \le 1$

D. $\dfrac{1}{\sqrt{2}} \le x \le 1$

Answer:

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69. The number of real solutions of the equations:

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

A. infinitely many

B. one

C. four

D. two

Answer:

---

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

---

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

A. 3

B. 4

C. 5

D. 1

Answer:

72. The value of $\cot\left(\cos ec^{-1}\left(\dfrac{5}{3}\right) + \tan^{-1}\left(\dfrac{2}{3}\right)\right)$ is

A. $\dfrac{5}{17}$

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

C. $\dfrac{3}{17}$

D. $\dfrac{4}{17}$

Answer:

73. If $0 < x < 1$, then

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

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

B. x

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

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

Answer:

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74. If $\tan^{-1} y = \tan^{-1} x + \tan^{-1}\left(\dfrac{2x}{1 - x^2}\right)$, where $|x| < \dfrac{1}{\sqrt{3}}$.

Then, the value of y is

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

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

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

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

Answer:

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75. Find the value of $\sin^{-1}\left(\dfrac{\sin(4\pi)}{5}\right)$

76. show that: $2\sin^{-1}\left(\dfrac{3}{5}\right) = \tan^{-1}\left(\dfrac{24}{7}\right)$

77. Write the value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\dfrac{\sqrt{3}}{2}\right)\right]$.

78. show that $\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{5}\right) + \tan^{-1}\left(\dfrac{1}{8}\right) = \dfrac{\pi}{4}$

79. If $\tan^{-1}\left(\dfrac{x-2}{x-4}\right) + \tan^{-1}\left(\dfrac{x+2}{x+4}\right) = \dfrac{\pi}{4}$ find the value of 'x'.

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80. Prove that : $\tan^{-1}\left(\dfrac{\cos x}{1+\sin x}\right) = \dfrac{\pi}{4} - \dfrac{x}{2}$, $x \in \left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

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81. Show that $2\sin^{-1}\left(\dfrac{3}{5}\right) - \tan^{-1}\left(\dfrac{17}{31}\right) = \dfrac{\pi}{4}$

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82.   Prove   that   :

$\tan^{-1} x + \tan^{-1} 2\dfrac{x}{1-x^2} = \tan^{-1}\left(\dfrac{3x-x^3}{1-3x^2}\right)$, $|x| < \dfrac{1}{\sqrt{3}}$

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83. If $\tan^{-1} x + \tan^{-1} y - \tan^{-1} z = 0$, then prove that $x + y + xyz = z$.

84. Let $f(x) = \sin\left(\dfrac{\pi}{6}\sin\left(\dfrac{\pi}{2}\sin x\right)\right)$ for all $x \in R$ and $g(x) = \dfrac{\pi}{2}\sin x f$ or $all x \in R$. Let (fog)(x) dentoe f(g(x)) and (gof)(x) denote g(f(x)). Then which of the following is (are) True?

A. Range of f is $\left[-\dfrac{1}{2}, \dfrac{1}{2}\right]$

B. Range of fog is $\left[-\dfrac{1}{2}, \dfrac{1}{2}\right]$

C. $\displaystyle\lim_{x \to 0} \dfrac{f(x)}{g(x)} = \dfrac{\pi}{6}$

D. There is an $x \in R$ such that (gof)(x)=1

Answer:

85. If $\alpha = 3\sin^{-1}\left(\dfrac{6}{11}\right)$ and $\beta = 3\cos^{-1}\left(\dfrac{4}{9}\right)$, 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:

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86. Let $f:(-1, 1)\overrightarrow{R}$ be such that $f(\cos 4\theta) = \dfrac{2}{2 - \sec^2\theta}$ for $\theta \in \left(0, \dfrac{\pi}{4}\right) \cup \left(\dfrac{\pi}{4}, \dfrac{\pi}{2}\right)$. Then the value(s) of $f\left(\dfrac{1}{3}\right)$ is (are)

A. $1 - \sqrt{\dfrac{3}{2}}$

B. $1 + \sqrt{\dfrac{3}{2}}$

C. $1 + \sqrt{\dfrac{2}{3}}$

D. $1 - \sqrt{\dfrac{2}{3}}$

Answer:

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87. Let $f\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right) \to R$ be given by (log(sec x + tan x))^3`. Then

A. f(x) is an odd function

B. f(x) is a one-one function

C. f(x) is a an onto function

D. f(x) is an even function

Answer:

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88. A function $f: Z \to rZ$ is defined as below

$$f(x) = \begin{cases} x+3 & \text{if } x \text{ is odd} \\ \frac{x}{2} & \text{if } x \text{ is even} \end{cases}$$

, If k is an odd integer and $f(f(k+3)) = 27$, then the sum of the digits of the number k equals.

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89. The number of linear functions satisfying

f(x+f(x))=x+f(x), ∀ x is ....

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

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91. If $f: R \to R$ satisfying:

$f(x - f(y)) = f(f(y)) + f(x) - 1$, f or $\text{all} x, y \in R$, then -f(10) equals.

92. Let a and b be constants f(x) = a sin x + bx cos x + $2x^2$ If f(3) = 15, then

f(-3) is

93. Number of solution of the equations: f(x-1) + f(x+1) = sin a, $0 < a$, $\dfrac{\pi}{2}$,

where $f(x) = \begin{cases} 1 - |x| & |x| \leq 1 \\ 0 & |x| > 1 \end{cases}$ is

94. If A={1,2,3}, B={1,3,5,7,9}, the ratio of number of one-one functions to the number of strictly monotonic functions is ....

95. The value of $f(x) = x + 2$, then f(12)=K ,where K equals

A. 1003

B. 2005

C. 2007

D. 2006

Answer:

96. If a , b are two natural numbers in AP such that a + b = 12 The number of ordered pairs (a,b) is

A. 1

B. 2

C. 3

D. 4

Answer:

97. If a,b are positive number and product of ab= 2500.The minimum value of a+b is

A. 1000

B. 2000

C. 3000

D. 2999

Answer:

98. If $f(x)^2 \times f\left(\dfrac{1-x}{1+x}\right) = 64x,\ x \neq 0, 1$ then f(x) is equal to

A. $x^{2/3}\left(\dfrac{1-x}{1+x}\right)^{1/3}$

B. $4x^{2/3}\left(\dfrac{1+x}{1-x}\right)^{1/3}$

C. $x^{1/3}\left(\dfrac{1-x}{1+x}\right)^{1/3}$

D. $x\left(\dfrac{1+x}{1-x}\right)^{1/3}$

Answer:

99. If f(x)= 6x+9,then domain of f(x) is

A. $[0, \infty]$

B. $(-\infty, \infty)$

C. $R - [-1, 1]$

D. None of these

Answer:

100. A relation R on A={1,2,3} given by R={1,2), (1, 2), (3, 3)} is not symmetric.

Why?

101. Let $*$ be a binary operation on N given by $a * b=$ HCF (a, b), $a, b, \in N.$ Write the value of $22 * 4$.

102. Find the value of $\sin^{-1}\left(\sin\dfrac{2\pi}{3}\right)$

103. Evaluate $\cot\left(\tan^{-1} a + \cot^{-1} a\right)$

104. Show that the relation R defined by

$(a, b)R(c, d) \Rightarrow a + d = b + c$ in the set N is an equivalence relation.

105. Find fog if `f(x) = |x| and g(x) = |5x-2|

106. Consider

$f: \{1, 2, 3\} \rightarrow \{a, b, c\}, given by f(1) = a, f(2) = b$ and $f(3) = c$. Find

f^-1 and show that $(f^-1)^-1 = f$

107. Let '*' be a binary operation on Q defined by a * b = (3ab)/5. Show that * is commutative as well as associative. Also, find its identity element, if it exists.

108. Prove that : $\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{5}\right) + \tan^{-1}\left(\dfrac{1}{8}\right) = \dfrac{\pi}{4}$

109.   find   the   value   of   x:

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

110. Prove the following: $\cos\left[\tan^{-1}\{\sin(\cot^{-1}x)\}\right] = \sqrt{\dfrac{1+x^2}{2+x^2}}$

111. Define a binary operation * on the set {0,1,2,3,4,5} as

$$a \cdot b = \begin{cases} a + b & \text{if } a + b < 6 \\ a + b - 6 & \text{if } a + b \geq 6 \end{cases}$$ Show that zero is the identity for

this operation and each element $a \neq 0$ of the set is invertible with 6 - a

being the inverse of a.