



MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

INVERSE TRIGONOMETRIC FUNCTION

Others

1. Evaluate: $\cos\left\{\sin^{-1}\left(-\frac{7}{25}\right)\right\}$ (ii) $\sec\left\{\cot^{-1}\left(-\frac{5}{12}\right)\right\}$
 $\cot\left\{\sec^{-1}\left(-\frac{13}{5}\right)\right\}$

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2. Prove that: $\sin^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{3}{4}\right)$

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3. Prove the following:

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

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4. If $\tan^{-1} \left\{ \frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}} \right\} = \alpha$, then prove that $x^2 = \sin 2\alpha$

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

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6. If $x = \operatorname{cosec} \left[\tan^{-1} \left\{ \cos \left(\cot^{-1} \left(\sec \left(\sin^{-1} a \right) \right) \right) \right\} \right]$ and
 $y = \sec \left[\cot^{-1} \left\{ \sin \left(\tan^{-1} \left(\operatorname{cosec} \left(\cos^{-1} a \right) \right) \right) \right\} \right]$ show that $x = y$

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7. Evaluate: $\sin\left\{\tan^{-1}\left(\frac{7}{24}\right)\right\}$ (ii) $\cos\left\{\cot^{-1}\left(\frac{5}{12}\right)\right\}$

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8. Solve: $\cos\{\cos^{-1}(x)\} = 0$

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

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10. Prove the following results: $\cot\left(\cos^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{4}{5}\right)\right) = 0$

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11. If $a, b, c > 0$ and $s = \frac{a + b + c}{2}$, prove that

$$\tan^{-1} \sqrt{\frac{2as}{bc}} + \tan^{-1} \sqrt{\frac{2bs}{ca}} + \tan^{-1} \sqrt{\frac{2cs}{ab}} = \pi$$

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12. 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

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

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

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14. Evaluate: $\tan^{-1}(1) + \tan^{-1}(0)$,



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15. Prove that:
$$\sum_{m=1}^n \tan^{-1} \left(\frac{2m}{m^4 + m^2 + 2} \right) = \tan^{-1} \left(\frac{n^2 + n}{n^2 + n + 2} \right)$$



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16. Sum the following series to infinity:

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



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



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18. If a_1, a_2, a_3, a_n are in arithmetic progression with common difference d , then evaluate the following expression:

$$\tan \left\{ \tan^{-1} \left(\frac{d}{1 + a_1 a_2} \right) + \tan^{-1} \left(\frac{d}{1 + a^2 a_3} \right) + \tan^{-1} \left(\frac{d}{1 + a_3 a_4} \right) + \dots \right.$$



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19. Prove that:

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



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20. If $x > y > z > 0$, then find the value of

$$\frac{\cot^{-1}(xy+1)}{x-y} + \frac{\cot^{-1}(yz+1)}{y-z} + \frac{\cot^{-1}(zx+1)}{z-x}$$



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21. Find the maximum and minimum values of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3$,

where $-1 \leq x \leq 1$.



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22. the greatest and least values of $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$

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23. Solve : $4 \sin^{-1} x = \pi - \cos^{-1} x$

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24. If $(\sin^{-1} x)^2 + (\cos^{-1} x)^2 = \frac{17\pi^2}{36}$, find x .

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25. Prove that : $\tan^{-1} 2 + \tan^{-1} 3 = \frac{3\pi}{4}$

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26. Prove that : $\tan^{-1}\left(\frac{2}{11}\right) + \tan^{-1}\left(\frac{7}{24}\right) = \tan^{-1}\left(\frac{1}{2}\right)$

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27. Prove that: $\frac{\sin^{-1}(12)}{13} + \frac{\cos^{-1} 4}{5} + \frac{\tan^{-1}(63)}{16} = \pi$

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28. Prove that: $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3 = \pi$

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

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

$$\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$$

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30. If $\tan^{-1} 2 + \tan^{-1} 3 + \theta = \pi$, find the value of θ .

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31. What is greater, $\tan 1$ or $\tan^{-1} 1$?

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32. Find the minimum value of n for which $\tan^{-1}\left(\frac{n}{\pi}\right) > \frac{\pi}{4}$, $n \in \mathbb{N}$.

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

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



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35. Find the principal value of $\cos^{-1} \left\{ \sin \left\{ \frac{\cos^{-1} 1}{2} \right\} \right\}$



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



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



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38. For the principal values, evaluate each of the following: (i)

$$\tan^{-1} \left\{ 2 \cos \left(2 \sin^{-1} \left(\frac{1}{2} \right) \right) \right\}, \text{ (ii) } \cot \left[\sin^{-1} \left\{ \cos \left(\tan^{-1} 1 \right) \right\} \right]$$

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39. For the principal values, evaluate each of the following:

$$\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$$

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40. Find the domain of $\sec^{-1}(3x - 1)$ (ii) $\sec^{-1} x - \tan^{-1} x$

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41. Show that $\cos^{-1} \left(\frac{\cos \alpha + \cos \beta}{1 + \cos \alpha \cos \beta} \right) = 2 \tan^{-1} \left(\tan \left(\frac{\alpha}{2} \right) \tan \left(\frac{\beta}{2} \right) \right)$

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42.

Show

that

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

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43. Prove the following: $4 \frac{\tan^{-1} 1}{5} - \frac{\tan^{-1} 1}{70} + \frac{\tan^{-1} 1}{99} = \frac{\pi}{4}$

$$2 \tan^{-1} \frac{1}{5} + \sec^{-1} \frac{5\sqrt{2}}{7} + 2 \frac{\tan^{-1} 1}{8} = \frac{\pi}{4}$$

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

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45. $\sin^{-1}(1-x) - 2 \sin^{-1} x = \frac{\pi}{2}$, then x is equal to (A) 0, $\frac{1}{2}$ (B) 1, $\frac{1}{2}$
(C) 0 (D) $\frac{1}{2}$

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46. If $y = \cot^{-1}(\sqrt{\cos x}) - \tan^{-1}(\sqrt{\cos x})$, prove that $\sin y = \frac{\tan^2 x}{2}$

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47. Evaluate: $\tan\left(2 \tan^{-1}\left(\frac{1}{5}\right)\right)$

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48. Prove that $\sin^{-1}\left[\frac{3}{5}\right] + \sin^{-1}\left[\frac{4}{5}\right] = \frac{\pi}{2}$

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

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

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51. Find the principal value of the following: $\sin^{-1}\left\{\cos\left(\sin^{-1}\left(\sqrt{\frac{3}{2}}\right)\right)\right\}$

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

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

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54. Find the domain of $f(x) = \sin^{-1} x + \cos x$.



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



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



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



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



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



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60. Prove that: $2 \tan^{-1} \left\{ \frac{1}{2} \right\} + \tan^{-1} \left\{ \frac{1}{7} \right\} = \tan^{-1} \left\{ \frac{31}{17} \right\}$



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61. Solve the equation:

$$\cos^{-1} \left(\frac{a}{x} \right) - \cos^{-1} \left(\frac{b}{x} \right) = \cos^{-1} \left(\frac{1}{b} \right) - \cos^{-1} \left(\frac{1}{a} \right)$$



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62. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, prove that

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



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

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



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



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65. Solve the following equations:

$$\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x + \sin^{-1}6x + \sin^{-1}6\sqrt{3}x = \frac{\pi}{2}$$



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66. Prove that $\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \cos^{-1}\left(\frac{36}{85}\right)$



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67. The value of

$$\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{2}{9}\right) + \tan^{-1}\left(\frac{4}{33}\right) + \tan^{-1}\left(\frac{8}{129}\right) + \dots n$$

terms is:



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



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69. Prove that:

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

when $\frac{\pi}{4}A \leq \frac{\pi}{2}$ and π , when $0 \leq A \leq \frac{\pi}{4}$



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70. If $\sin\{\cot^{-1}(x + 1)\} = \cos(\tan^{-1} x)$, then find x .

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71. Solve the following equation for x : $\cos(\tan^{-1} x) = \sin\left(\frac{\cot^{-1} 3}{4}\right)$

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72. Write each of the following in the simplest form:

$$\cot^{-1}\left\{\frac{a}{\sqrt{x^2 - a^2}}\right\}, |x| > a$$

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73. Evaluate: $\sin(\cot^{-1} x)$

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74. Simplify each of the following: $\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right)$

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75. Evaluate the following: $\sin^{-1}(\sin 10)$

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76. Prove that: $\sec(\tan^{-1} 1) + \operatorname{cosec}(\cot^{-1} 1) = 4$

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77. Prove that: $\sin[\cot^{-1}\{\cos(\tan^{-1} x)\}] = \sqrt{\frac{x^2 + 1}{x^2 + 2}}$

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

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79. Find the value of the expression $\sin\left[\cot^{-1}\left\{\cos\left(\frac{\pi}{2}\right)\right\}\right]$

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

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81. If $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$, then write the value of $x + y + xy$.

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



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83. Solve the following equation for x :

$$\tan^{-1}\left(\frac{1}{4}\right) + 2\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{6}\right) + \tan^{-1}\left(\frac{1}{x}\right) = \frac{\pi}{4}$$



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84. Write the value of $\cos^2\left(\frac{1}{2}\cos^{-1}\frac{3}{5}\right)$



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85. Write the value of $\sin^{-1}(\sin 1550^\circ)$



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86. Prove that:

$$\tan^{-1}\left\{\frac{\cos 2\alpha \sec 2\beta + \cos 2\beta \sec 2\alpha}{2}\right\} = \tan^{-1}\{\tan^2(\alpha + \beta)\tan^2(\alpha - \beta)\}$$



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87. Prove that:

$$\frac{\alpha^3}{2} \operatorname{cosec}^2\left(\frac{1}{2} \tan^{-1} \alpha\right) + \frac{\beta^3}{2} \sec^2\left(\frac{1}{2} \tan^{-1} \beta\right) = (\alpha + \beta)(\alpha^2 + \beta^2).$$



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88. Show that $2 \tan^{-1} x + \frac{\sin^{-1}(2x)}{1+x^2}$ is constant for $x \geq 1$, find that constant.



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



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90. Simplify each of the following: $\cos^{-1}\left(\frac{3}{5}\cos x + \frac{4}{5}\sin x\right)$, where $-\frac{3\pi}{4} \leq x \leq \frac{\pi}{4}$

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91. Write the following functions in the simplest form:

$$\tan^{-1}\left\{\frac{x}{\sqrt{a^2 - x^2}}\right\}$$

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92. Evaluate each of the following:

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

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

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

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93. For the principal values, evaluate the following:

$$\cot^{-1}(-1) + \operatorname{cosec}^{-1}(-\sqrt{2}) + \operatorname{secs}^{-1}(2)$$

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

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95. Evaluate each of the following: (i) $\sin^{-1} \left(\frac{\sin \pi}{3} \right)$ (ii) $\cos^{-1} \left(\frac{\cos(2\pi)}{3} \right)$

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96. If $\operatorname{cosec}^{-1}x + \operatorname{cosec}^{-1}y + \operatorname{cosec}^{-1}z = -\frac{3\pi}{2}$, find the value of

$$\frac{x}{y} + \frac{y}{z} + \frac{z}{x}$$

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97. For the principal values, evaluate the following:

$$\tan^{-1} \sqrt{3} - \sec^{-1}(-2)$$

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98. Find the principal values of $\cot^{-1} \sqrt{3}$ and $\cot^{-1}(-1)$

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99. For the principal values, evaluate the following:

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

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100. The value of $\tan\left\{\frac{\cos^{-1} 1}{5\sqrt{2}} - \frac{\sin^{-1} 4}{\sqrt{17}}\right\}$ is $\frac{\sqrt{29}}{3}$ (b) $\frac{29}{3}$ (c) $\frac{\sqrt{3}}{29}$ (d)

$$\frac{3}{29}$$

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101. $\sin(\cot^{-1}(\tan(\cos^{-1} x)))$ is equal to a) x b) $\sqrt{1-x^2}$ c) $\frac{1}{x}$ d) none of these

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

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103. Write the principal value of $\cos^{-1}(\cos 680^\circ)$.

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

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105. Write the principal value of

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

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106. Find x if $\tan^{-1}(\sqrt{3}) + \cot^{-1} x = \frac{\pi}{2}$

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107. If $\sin^{-1}\left(\frac{1}{3}\right) + \cos^{-1} x = \frac{\pi}{2}$, then find x

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108. Write the value of $2 \sin^{-1} \frac{1}{2} + \cos^{-1} \left(\frac{a-b}{a+b}\right)$

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

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

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111. Prove that $\tan(\cot^{-1} x) = \cot(\tan^{-1} x)$

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112. Evaluate: $\tan\left\{\cos^{-1}\left(-\frac{7}{25}\right)\right\}$

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113. Evaluate: $\sin\left\{\sin^{-1}\left(-\frac{3}{5}\right) + \cot^{-1}\left(-\frac{5}{12}\right)\right\}$

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114. If $-1 \leq x, y \leq 1$ such that $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, find the value of $\cos^{-1} x + \cos^{-1} y$.

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115. If $\tan^{-1} x + \tan^{-1} y = \frac{4\pi}{5}$, find $\cot^{-1} x + \cot^{-1} y$.

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116. If $\tan^{-1} x - \cot^{-1} x = \tan^{-1} \frac{1}{\sqrt{3}}$ find the value of x .

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117. If $\sin\left(\cos^{-1}\left(\frac{5}{13}\right) + \sin^{-1}x\right) = 1$ find the value of x .

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118. If $\cos\left(\sin^{-1}\left(\frac{2}{5}\right) + \cos^{-1}x\right) = 0$ find the value of x .

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119. Evaluate : $\cos\left(2\cos^{-1}x + \sin^{-1}x\right) \text{ at } x = \frac{1}{5}$

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120. Let $f(x) = e^{\cos^{-1}\left\{\sin\left(x + \frac{\pi}{3}\right)\right\}}$ Then, $f\left(\frac{8\pi}{9}\right) =$ (a) $e^{5\pi/18}$ (b) $e^{13\pi/18}$ (c) $e^{-2\pi/18}$ (d) none of these

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121. If $u = \cot^{-1} \sqrt{\tan \alpha} - \tan^{-1} \sqrt{\tan \alpha}$, then $\tan\left(\frac{\pi}{4}, \frac{u}{2}\right)$ is equal to

- (a) $\sqrt{\tan \alpha}$ (b) $\sqrt{\cot \alpha}$ (c) $\tan \alpha$ (d) $\cot \alpha$

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122. The number of real solutions of the equation

$$\sqrt{1 + \cos 2x} = \sqrt{2} \sin^{-1}(\sin x), \quad -\pi \leq x \leq \pi$$

is (a) 0 (b) 1 (c) 2 (d) infinite

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123. If $\alpha = \tan^{-1}\left(\tan \frac{5\pi}{4}\right)$ and $\beta = \tan^{-1}\left(-\frac{\tan(2\pi)}{3}\right)$, then

$4\alpha = 3\beta$ (b) $3\alpha = 4\beta$ (c) $\alpha - \beta = 74\alpha = \frac{3\beta}{12}$ none of these

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124. The domain of $\cos^{-1}(x^2 - 4)$ is

A. (a) $[3,5]$

B. (b) $[-1, 1]$

C. (c) $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$

D. (d) $-\sqrt{5}, -\sqrt{3}] \cap [-\sqrt{5}, \sqrt{3}]$

Answer: null



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125. In a ABC , , if C is a right angle, then

$$\tan^{-1}\left(\frac{a}{b+c}\right) + \tan^{-1}\left(\frac{b}{c+a}\right) =$$

A. (a) $\frac{\pi}{3}$

B. (b) $\frac{\pi}{4}$

C. (c) $\frac{5\pi}{2}$

D. (d) $\frac{\pi}{6}$

Answer: null



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126. If

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

then x is equal to

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

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

C. (C) $\sqrt{3}$

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

Answer: null



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



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128. Solve the equation of x : $\sin^{-1} x + \sin^{-1}(1 - x) = \cos^{-1} x$

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$$129. \cos\left(\sin^{-1}\left(\frac{3}{5}\right) + \cot^{-1}\left(\frac{3}{2}\right)\right) = \frac{6}{5\sqrt{13}}$$

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130. Prove that: $\frac{\tan^{-1}(63)}{16} = \frac{\sin^{-1} 5}{13} + \frac{\cos^{-1} 3}{5}$

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131. Prove that: $\sin^{-1}\left(\frac{63}{65}\right) = \sin^{-1}\left(\frac{5}{13}\right) + \cos^{-1}\left(\frac{3}{5}\right)$

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132. Solve the following equation for x :

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

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133. Solve the following equation for x :

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

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134. Solve for x : $2 \tan^{-1}(\sin x) = \tan^{-1}(2 \sec x)$, $x \neq \frac{\pi}{2}$

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

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

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

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

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

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



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141. Find the domain of $f(x) = \sin^{-1}x + \cos x$.



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



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



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144. Let $x, y, z \in [-1, 1]$ such that $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$. Find the value of $x^{2018} + y^{2019} + z^{2020}$

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145. Let $x, y, z \in [-1, 1]$ such that $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$. Find the value of $x^{2016} + y^{2018} + z^{2020} - \frac{9}{x^{2016} + y^{2018} + z^{2020}}$

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146. Find the principal value of each of the following: (i) $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$
(ii) $\sin^{-1}\left(\cos\left(\frac{\pi}{3}\right)\right)$ (iii) $\sin^{-1}\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right)$

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147. Find the principal value of each of the following: $\sin^{-1}\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)$

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

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

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

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150. Find the domain of each of the following functions: $f(x) = \sin^{-1} x^2$

(ii) $f(x) = \sin^{-1} x + \sin x$

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151. Find the domain of each of the following functions:

$$f(x) = \sin^{-1} \sqrt{x^2 - 1} \quad (\text{ii}) \quad f(x) = \sin^{-1} x + \sin^{-1} 2x$$

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152. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z + \sin^{-1} t = 2\pi$, then find the value of $x^2 + y^2 + z^2 + t^2$.

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

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154. Find the domain of $\cos^{-1}(2x - 1)$



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

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

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

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

$$x(y+z) + y(z+x) + z(x+y)$$

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

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160. Find the domain of definition of $f(x) = \cos^{-1}(x^2 - 4)$.

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161. Find the domain of $f(x) = 2 \cos^{-1} 2x + \sin^{-1} x$.

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162. Find the domain of $f(x) = \cos^{-1} x + \cos x$.

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163. Find the principal value of each of the following: (i) $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

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

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164. Find the principal value of each of the following: (i)

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

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165. For the principal values, evaluate each of the following : (i)

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



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166. For the principal values, evaluate each of the following : (i)

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

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

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167. Find the principal value of $\tan^{-1}(-\sqrt{3})$

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168. Find the principal value of $\tan^{-1}(1)$

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



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



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171. For the principal values, evaluate each of the following: (i)

$$\tan^{-1}\left\{2\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)\right\} \quad \text{(ii) } \cot\left[\sin^{-1}\left\{\cos\left(\tan^{-1}1\right)\right\}\right]$$



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172. For the principal values, evaluate each of the following: (i)

$$\tan^{-1}\left\{2\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)\right\} \quad \text{(ii) } \cot\left[\sin^{-1}\left\{\cos\left(\tan^{-1}1\right)\right\}\right]$$



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173. What is greater, $\tan 1$ or $\tan^{-1}1$?



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174. Find the minimum value of n for which $\tan^{-1}\left(\frac{n}{\pi}\right) > \frac{\pi}{4}$, $n \in \mathbb{N}$.



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175. Find the principal value of each of the following: (i) $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (ii)

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



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176. Find the principal value of each of the following: $\tan^{-1}\left(\frac{\cos \pi}{2}\right)$ (ii)

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



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177. For the principal value, evaluate $\tan^{-1}(-1) + \cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

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178. For the principal value, evaluate $\tan^{-1}\left\{2 \sin\left(4 \frac{\cos^{-1}(\sqrt{3})}{2}\right)\right\}$

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

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180. Evaluate: $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) + \tan^{-1}(-\sqrt{3}) + \tan^{-1}\left(\sin\left(-\frac{\pi}{2}\right)\right)$

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181. Evaluate: $\tan^{-1}\left\{\tan\left(\frac{5\pi}{6}\right)\right\} + \cos^{-1}\left\{\cos\left(\frac{13\pi}{6}\right)\right\}$

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182. Find the principal value of $\sec^{-1}(2)$

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183. Find the principal value of $\sec^{-1}\left(\frac{-2}{\sqrt{3}}\right)$

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184. Find the set of values of $\sec^{-1}\left(\frac{\sqrt{3}}{2}\right)$

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

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

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187. Find the principal values of each of the following: $\sec^{-1}(-\sqrt{2})$ (ii)
 $\sec^{-1}(2)$

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188. Find the principal values of each of the following: $\sec^{-1}\left(2\frac{\sin(3\pi)}{4}\right)$
(ii) $\sec^{-1}\left(2\frac{\tan(3\pi)}{4}\right)$

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189. Find the principal value of $\tan^{-1} \sqrt{3} - \sec^{-1}(-2)$

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190. For the principal value, evaluate

$$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) - 2\sec^{-1}\left(2\frac{\tan \pi}{6}\right)$$

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191. Find the domain of (i) $\sec^{-1}(3x - 1)$ (ii) $\sec^{-1} x - \tan^{-1} x$

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192. Find the domain of $\sec^{-1}(3x - 1)$ (ii) $\sec^{-1} x - \tan^{-1} x$

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193. Find the principal values of (1) $\operatorname{cosec}^{-1}(2)$ and $\operatorname{cosec}^{-1}\left(-\frac{2}{\sqrt{3}}\right)$

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194. Find the principal value of $\operatorname{cosec}^{-1}(-2)$.

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195. For the principal values, evaluate the following: (1)

$$\cot^{-1}(-1) + \operatorname{cosec}^{-1}(-\sqrt{2}) + \sec^{-1}(2) \quad (2)$$

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

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196. For the principal values, evaluate each of the following:

$$\tan^{-1} \sqrt{3} - \sec^{-1}(-2) + \operatorname{cosec}^{-1} \frac{2}{\sqrt{3}} - 2 \sec^{-1}(2) - 2 \operatorname{cosec}^{-1}(-2)$$

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197. If $\operatorname{cosec}^{-1}x + \operatorname{cosec}^{-1}y + \operatorname{cosec}^{-1}z = -\frac{3\pi}{2}$, find the value of $\frac{x}{y} + \frac{y}{z} + \frac{z}{x}$.

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198. Find the principal values of each of the following: (i)

$$\operatorname{cosec}^{-1}(-\sqrt{2}) \quad \text{(ii) } \operatorname{cosec}^{-1}(-2)$$

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199. Find the principal values of each of the following: (i)

$$\operatorname{cosec}^{-1}\left(\frac{2}{\sqrt{3}}\right) \quad \text{(ii) } \operatorname{cosec}^{-1}\left(2 \cos\left(\frac{2}{3}\pi\right)\right)$$



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200. Find the set of values of $\operatorname{cosec}^{-1}\left(\frac{\sqrt{3}}{2}\right)$



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201. For the principal values, evaluate the following:

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

$$\sec^{-1}(\sqrt{2}) + 2 \operatorname{cosec}^{-1}(-\sqrt{2})$$

$$\sin^{-1}[\cos\{2 \operatorname{cosec}^{-1}(-2)\}]$$

$$\operatorname{cosec}^{-1}\left(2\frac{\tan(11\pi)}{6}\right)$$



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202. For the principal values, evaluate the following:

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

$$\sec^{-1}(\sqrt{2}) + 2 \operatorname{cosec}^{-1}(-\sqrt{2})$$

$$\sin^{-1}[\cos\{2 \operatorname{cosec}^{-1}(-2)\}]$$

$$\operatorname{cosec}^{-1}\left(2 \frac{\tan(11\pi)}{6}\right)$$

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203. Find the set of values of $\cot^{-1}(1)$ and $\cot^{-1}(-1)$

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204. Find the principal values of $\cot^{-1}\sqrt{3}$ and $\cot^{-1}(-1)$

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205. For the principal values, evaluate the following: (i)

$$\cot^{-1}(-1) + \operatorname{cosec}^{-1}(-\sqrt{2}) + \sec^{-1}(2) \quad \text{(ii)}$$

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

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206. For the principal values, evaluate the following:

$$\cot^{-1}(-1) + \operatorname{cosec}^{-1}(-\sqrt{2}) + \operatorname{secs}^{-1}(2)$$

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

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207. Find the principal values of each of the following: $\cot^{-1}(-\sqrt{3})$ (ii)

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

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208. Find the principal values of each of the following:

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

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

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209. Find the domain of $\cot x + \cot^{-1} x$



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210. Evaluate each of the following: (i)

$$\cot^{-1}\left(\frac{1}{\sqrt{3}}\right) - \operatorname{cosec}^{-1}(-2) + \sec^{-1}\left(\frac{2}{\sqrt{3}}\right) \quad \text{(ii)}$$

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



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211. Evaluate each of the following: (i)

$$\operatorname{cosec}^{-1}\left(-\frac{2}{\sqrt{3}}\right) + 2 \cot^{-1}(-1) \quad \text{(ii)}$$

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



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212. Evaluate each of the following: $\sin^{-1}\left(\frac{\sin \pi}{3}\right)$ (ii) $\cos^{-1}\left(\frac{\cos(2\pi)}{3}\right)$
(iii) $\tan^{-1}\left(\frac{\tan \pi}{4}\right)$

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213. Evaluate each of the following: $\sin^{-1}\left(\frac{\sin(2\pi)}{3}\right)$ (ii)
 $\cos^{-1}\left(\frac{\cos(7\pi)}{6}\right)$ (iii) $\tan^{-1}\left(\frac{\tan(3\pi)}{4}\right)$

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214. Evaluate each of the following: (i) $\sin^{-1}(\sin(-600^\circ))$ (ii)
 $\cos^{-1}(\cos(-680^\circ))$

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215. Express each of the following in the simplest form:

$$\tan^{-1}\left\{\sqrt{\frac{1 - \cos x}{1 + \cos x}}\right\}$$



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216. Express each of the following in the simplest form:

$$\tan^{-1} \left\{ \frac{\cos x}{1 - \sin x} \right\}, \text{ where } -\frac{\pi}{2} < x < \frac{\pi}{2} \quad (\text{ii}) \quad \tan^{-1} \left(\frac{\cos x - \sin x}{\cos x + \sin x} \right), -\frac{\pi}{4} < x < \frac{\pi}{4}$$



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



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



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219. Prove that:

$$\tan^{-1} \left\{ \frac{\sqrt{1 + \cos x} + \sqrt{1 - \cos x}}{\sqrt{1 + \cos x} - \sqrt{1 - \cos x}} \right\} = \frac{\pi}{4} + \frac{x}{2}, \quad \text{if } \pi < x < 3\frac{\pi}{2}$$

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220. Prove that:

$$\cot^{-1} \left\{ \frac{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}} \right\} = \frac{\pi}{2} - \frac{x}{2},$$

if $\frac{\pi}{2} < x < \pi$

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221. Write the following functions in the simplest form: (i)

$$\tan^{-1} \left\{ \frac{x}{\sqrt{a^2 - x^2}} \right\}, \quad -a < x < a \quad \text{(ii)}$$

$$\tan^{-1} \left\{ \sqrt{\frac{a-x}{a+x}} \right\}, \quad -a < x < a$$

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222. Write the following functions in the simplest form: (i)

$$\sin^{-1} \left\{ \frac{x}{\sqrt{x^2 + a^2}} \right\} \quad \text{(ii) } \cos^{-1} \left\{ \frac{x}{\sqrt{x^2 + a^2}} \right\}$$

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

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224. Prove that $\tan^{-1} \left(\frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}} \right) = \frac{\pi}{4} + \frac{1}{2} \cos^{-1} x^2$.

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225. Simplify each of the following: $\cos^{-1} \left(\frac{3}{5} \cos x + \frac{4}{5} \sin x \right)$, where

$$-\frac{3\pi}{4} \leq x \leq \frac{\pi}{4} \quad \sin^{-1} \left(\frac{5}{13} \cos x + \frac{12}{13} \sin x \right)$$

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226. Simplify: $\sin^{-1}\left(\frac{5}{13}\cos x + \frac{12}{13}\sin x\right)$

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227. Simplify: $\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right)$ where $-\frac{\pi}{4} < x < \frac{\pi}{4}$

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228. Simplify: $\cos^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right), \frac{\pi}{4} < x < \frac{5\pi}{4}$

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229. Simplify each of the following:

$\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right), \frac{\pi}{4} < x < \frac{5\pi}{4}$ (ii)

$\cos^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right), \frac{5\pi}{4} < x < \frac{9\pi}{4}$



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230. Evaluate the following: $\sin^{-1}(\sin 10)$ (ii) $\sin^{-1}(\sin 5)$



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231. Evaluate the following: $\cos^{-1}(\cos 10)$ (ii) $\tan^{-1}\{\tan(-6)\}$



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232. Evaluate each of the following: $\sin^{-1}\left(\sin\left(\frac{\pi}{6}\right)\right)$ (ii)
 $\sin^{-1}\left(\sin\left(\frac{7\pi}{6}\right)\right)$ (iii) $\sin^{-1}\left(\sin\left(\frac{5\pi}{6}\right)\right)$



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233. Evaluate each of the following: (i) $\sin^{-1}\left(\sin\left(\frac{13\pi}{7}\right)\right)$ (ii)
 $\sin^{-1}\left(\sin\left(\frac{17\pi}{8}\right)\right)$ (iii) $\sin^{-1}\left\{\sin\left(-\frac{17\pi}{8}\right)\right\}$



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234. Evaluate each of the following: $\sin^{-1}(\sin 3)$ (ii) $\sin^{-1}(\sin 4)$



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235. Evaluate each of the following: $\sin^{-1}(\sin 12)$ (ii) $\sin^{-1}(\sin 2)$



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236. Evaluate each of the following: (i) $\cos^{-1}\left\{\cos\left(-\frac{\pi}{4}\right)\right\}$ (ii) $\cos^{-1}\left(\cos\left(\frac{5\pi}{4}\right)\right)$ (iii) $\cos^{-1}\left(\cos\left(\frac{4\pi}{3}\right)\right)$



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237. Evaluate each of the following: (i) $\cos^{-1}\left(\cos\left(\frac{13\pi}{6}\right)\right)$ (ii) $\cos^{-1}(\cos 3)$ (iii) $\cos^{-1}(\cos 4)$



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238. Evaluate each of the following: $\cos^{-1}(\cos 5)$ (ii) $\cos^{-1}(\cos 12)$



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239. Evaluate each of the following: $\tan^{-1}\left(\frac{\tan \pi}{3}\right)$ (ii)
 $\tan^{-1}\left(\frac{\tan(6\pi)}{7}\right)$ (iii) $\tan^{-1}\left(\frac{\tan(7\pi)}{6}\right)$



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240. Evaluate each of the following: $\tan^{-1}\left(\frac{\tan(9\pi)}{4}\right)$ (ii) $\tan^{-1}(\tan 1)$
(iii) $\tan^{-1}(\tan 2)$



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241. Evaluate each of the following: $\tan^{-1}(\tan 4)$ (ii) $\tan^{-1}(\tan 12)$



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242. Evaluate each of the following: $\sec^{-1}\left(\frac{\sec \pi}{3}\right)$ (ii) $\sec^{-1}\left(\frac{\sec(2\pi)}{3}\right)$
(iii) $\sec^{-1}\left(\frac{\sec(5\pi)}{4}\right)$



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243. Evaluate each of the following: $\sec^{-1}\left(\frac{\sec(7\pi)}{3}\right)$ (ii)
 $\sec^{-1}\left(\frac{\sec(9\pi)}{5}\right)$ (iii) $\sec^{-1}\left\{\sec\left(-\frac{7\pi}{3}\right)\right\}$



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244. Evaluate each of the following: $\sec^{-1}\left(\frac{\sec(13\pi)}{4}\right)$ (ii)
 $\sec^{-1}\left(\frac{\sec(25\pi)}{6}\right)$



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245. Evaluate each of the following: $\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{\pi}{4}\right)$ (ii)

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



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246. Evaluate each of the following: $\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{6\pi}{5}\right)$ (ii)

$$\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{11\pi}{6}\right)$$



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247. Evaluate each of the following: $\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{13\pi}{6}\right)$ (ii)

$$\operatorname{cosec}^{-1}\left\{\operatorname{cosec}\left(-\frac{9\pi}{4}\right)\right\}$$



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248. Evaluate each of the following: $\cot^{-1}\left(\frac{\cot \pi}{3}\right)$ (ii) $\cot^{-1}\left(\frac{\cot(4\pi)}{3}\right)$

(iii) $\cot^{-1}\left(\frac{\cot(9\pi)}{4}\right)$

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249. Evaluate each of the following: $\cot^{-1}\left(\cot\left(\frac{19\pi}{6}\right)\right)$ (ii)
 $\cot^{-1}\left\{\cot\left(-\frac{8\pi}{3}\right)\right\}$ (iii) $\cot^{-1}\left\{\cot\left(\frac{21\pi}{4}\right)\right\}$

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250. Write each of the following in the simplest form:
 $\cot^{-1}\left\{\frac{a}{\sqrt{x^2 - a^2}}\right\}$, $|x| > a$ (ii) $\tan^{-1}\left\{x + \sqrt{1 + x^2}\right\}$, $x \in R$

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251. Write each of the following in the simplest form:
 $\tan^{-1}\left\{\sqrt{1 + x^2} - x\right\}$, $x \in R$ (ii) $\tan^{-1}\left\{\frac{\sqrt{1 + x^2} - 1}{x}\right\}$, $x \neq 0$

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252. Write each of the following in the simplest form:

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

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253. Write each of the following in the simplest form:

$$\tan^{-1} \left\{ \frac{x}{a + \sqrt{a^2 - x^2}} \right\} \quad \text{where } -a < x < a \quad (\text{ii}) \quad \sin^{-1} \left\{ \frac{x + \sqrt{1-x^2}}{\sqrt{2}} \right\},$$
$$-\frac{1}{2} < x < \frac{1}{\sqrt{2}}$$

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254. Evaluate $\int (\sin 5x + e^{5x}) dx$

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255. Evaluate $\int \tan 5x dx$

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256. Evaluate $\int (x - 2)(x - 1) dx$

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257. Evaluate $\int (x - 1)(x - 3) dx$

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258. Evaluate $\int (2 - x)(1 - x) dx$

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259. Evaluate each of the following: $\tan\left(\frac{\tan^{-1} 3}{4}\right)$ (ii) $\tan\left(\frac{\sin^{-1} 5}{13}\right)$
(iii) $\tan\left(\frac{\cos^{-1} 8}{17}\right)$

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260. Evaluate each of the following: $\tan\left(\operatorname{cosec}^{-1}\frac{13}{5}\right)$ (ii)
 $\tan\left(\sec^{-1}\frac{13}{12}\right)$ (iii) $\tan\left(\cot^{-1}\frac{8}{15}\right)$

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261. Evaluate: $\sin(\cot^{-1} x)$ (ii) $\cos(\tan^{-1} x)$

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

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

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264. Find the value of the expression $\sin[\cot^{-1}\{\cos(\tan^{-1}x)\}]$

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265. Prove that: $\sec^2(\tan^{-1}2) + \operatorname{cosec}^2(\cot^{-1}3) = 15$ and $\tan^2(\sec^{-1}2) + \cot^2(\operatorname{cosec}^{-1}3) = 11$

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266. Prove that: $\sec^2(\tan^{-1}2) + \operatorname{cosec}^2(\cot^{-1}3) = 15$ and $\tan^2(\sec^{-1}2) + \cot^2(\operatorname{cosec}^{-1}3) = 11$

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267. Prove that: $\sin[\cot^{-1}\{\cos(\tan^{-1}x)\}] = \sqrt{\frac{x^2+1}{x^2+2}} \cos[\tan^{-1}(\cot^{-1}x)]$

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268. Prove that: $\sin[\cot^{-1}\{\cos(\tan^{-1} x)\}] = \sqrt{\frac{x^2 + 1}{x^2 + 2}}$
 $\cos[\tan^{-1}\{\sin(\cot^{-1} x)\}] = \sqrt{\frac{x^2 + 1}{x^2 + 2}}$

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269. If $\sin\{\cot^{-1}(x + 1)\} = \cos(\tan^{-1} x)$, then find x

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270. Evaluate $\int x \cdot (x - 5) dx$

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271. Solve the following equation for x :

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



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272. If $x = \operatorname{cosec}[\tan^{-1}\{\cos(\cot^{-1}(\sec(\sin^{-1} a)))\}]$ and $y = \sec[\cot^{-1}\{\sin(\tan^{-1}(\operatorname{cosec}(\cos^{-1} a)))\}]$ then find the relation between x and y



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273. 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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274. Evaluate $\int x^2(x-1)dx$



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275. If $\tan^{-1}\left\{\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right\} = \alpha$, then prove that $x^2 = \sin 2\alpha$

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276. Evaluate $\int x^3(x-1)dx$

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277. Evaluate each of the following: $\sin\left(\frac{\sin^{-1}7}{25}\right)$ (ii) $\sin\left(\frac{\cos^{-1}5}{13}\right)$ (iii) $\sin\left(\frac{\tan^{-1}(24)}{7}\right)$

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278. Evaluate each of the following: $\sin\left(\sec^{-1}\left(\frac{17}{8}\right)\right)$ (ii) $\operatorname{cosec}\left(\cos^{-1}\left(\frac{3}{5}\right)\right)$ (iii) $\sec\left(\sin^{-1}\left(\frac{12}{13}\right)\right)$

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279. Evaluate each of the following: $\tan\left(\cos^{-1}\frac{8}{17}\right)$ (ii) $\cot\left(\cos^{-1}\frac{3}{5}\right)$
(iii) $\cos\left(\tan^{-1}\frac{24}{7}\right)$

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280. Evaluate $\int x^5(x - 1)dx$

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281. Evaluate $\int x^6(2 - x)dx$

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282. Evaluate $\int x(x^7 - 1)dx$

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283. Solve: $\cos\{2 \sin^{-1}(-x)\} = 0$

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284. Evaluate: $\cos\left\{\sin^{-1}\left(-\frac{5}{13}\right)\right\}$ (ii) $\cot\left\{\sin^{-1}\left(-\frac{7}{25}\right)\right\}$

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285. Evaluate: $\sec\left\{\sin^{-1}\left(-\frac{8}{17}\right)\right\}$

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286. Evaluate: (i) $\sin\left\{\cos^{-1}\left(-\frac{3}{5}\right)\right\}$ (ii) $\tan\left\{\cos^{-1}\left(-\frac{12}{13}\right)\right\}$

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287. Evaluate: $\operatorname{cosec}\left\{\cos^{-1}\left(-\frac{12}{13}\right)\right\}$

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288. Evaluate: $\sin\left\{\tan^{-1}\left(-\frac{7}{24}\right)\right\}$ (ii) $\cos\left\{\cot^{-1}\left(-\frac{5}{12}\right)\right\}$

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289. Evaluate: $\operatorname{cosec}\left\{\cot^{-1}\left(-\frac{4}{3}\right)\right\}$

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290. Prove that: $\sin^{-1}\left(-\frac{4}{5}\right) = \tan^{-1}\left(-\frac{4}{3}\right) = \cos^{-1}\left(-\frac{3}{5}\right) - \pi$

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291. Prove that:

$$\tan^{-1} x + \frac{\tan^{-1} 1}{x} = \begin{cases} \frac{\pi}{2}, & \text{if } x > 0, \\ -\frac{\pi}{2} & \text{if } x < 0 \end{cases}$$

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292. Evaluate: $\cos\left\{\sin^{-1}\left(-\frac{7}{25}\right)\right\}$ (ii) $\sec\left\{\cot^{-1}\left(-\frac{5}{12}\right)\right\}$ (iii)
 $\cot\left\{\sec^{-1}\left(-\frac{13}{5}\right)\right\}$

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293. Evaluate: $\cot\left\{\sec^{-1}\left(-\frac{13}{5}\right)\right\}$

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294. Evaluate: (i) $\tan\left\{\cos^{-1}\left(-\frac{7}{25}\right)\right\}$ (ii) $\operatorname{cosec}\left\{\cot^{-1}\left(-\frac{12}{5}\right)\right\}$
 $\cos\left\{\tan^{-1}\left(-\frac{3}{4}\right)\right\}$

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295. Evaluate: $\sin \left\{ \sin^{-1} \left(-\frac{3}{5} \right) + \cot^{-1} \left(-\frac{5}{12} \right) \right\}$

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296. Find the value of $\cot \left(\tan^{-1} a + \cot^{-1} a \right)$

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297. If $-1 \leq x, y \leq 1$ such that $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, find the value of $\cos^{-1} x + \cos^{-1} y$.

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298. If $\tan^{-1} x + \tan^{-1} y = \frac{4\pi}{5}$, find $\cot^{-1} x + \cot^{-1} y$.

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299. If $\tan^{-1} x - \cot^{-1} x = \frac{\tan^{-1} 1}{\sqrt{3}}$ find the value of x .

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300. If $\sin\left(\frac{\cos^{-1} 5}{13} + \sin^{-1} x\right) = 1$ find the value of x .

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

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302. If $\cos\left(\sin^{-1}\left(\frac{2}{5}\right) + \cos^{-1} x\right) = 0$ find the value of x .

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303. Evaluate : $\cos(2 \cos^{-1} x + \sin^{-1} x)$ at $x = \frac{1}{5}$

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

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305. Prove that $\tan(\cot^{-1} x) = \cot(\tan^{-1} x)$

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306. Find the greatest and least values of $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$

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307. Find the maximum and minimum values of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3$, where $-1 \leq x \leq 1$.

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308. Evaluate: (i) $\cot\left(\sin^{-1}\left(\frac{3}{4}\right) + \sec^{-1}\left(\frac{4}{3}\right)\right)$ (ii)
 $\sin\left(\tan^{-1} x + \tan^{-1}\left(\frac{1}{x}\right)\right)$ for $x < 0$

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309. Evaluate: (i) $\cot(\tan^{-1} a + \cot^{-1} a)$

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310. Evaluate: $\cos(\sec^{-1} x + \operatorname{cosec}^{-1} x)$, $|x| \geq 1$

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311. If $-1 \leq x, y \leq 1$ such that $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, find the value of $\cos^{-1} x + \cos^{-1} y$.

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312. If $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{3}$ and $\cos^{-1} x - \cos^{-1} y = \frac{\pi}{6}$, find the values of x and y .

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313. If $\cos\left(\frac{\cos^{-1} 3}{5} + \sin^{-1} x\right) = 0$, find the values of x .

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314. If $(\sin^{-1} x)^2 + (\cos^{-1} x)^2 = \frac{17\pi^2}{36}$, find x

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315. If $\sin\left(\sin^{-1}\left(\frac{1}{5}\right) + \cos^{-1}(x)\right) = 1$ Find the value of x .

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316. Solve: $\sin^{-1} x = \frac{\pi}{6} + \cos^{-1} x$

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317. Solve : $4 \sin^{-1} x = \pi - \cos^{-1} x$

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318. Solve: $\tan^{-1} x + 2 \cot^{-1} x = \frac{2\pi}{3}$

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319. Solve: $5 \tan^{-1} x + 3 \cot^{-1} x = 2\pi$



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320. Prove that: $\tan^{-1}\left(\frac{2}{11}\right) + \tan^{-1}\left(\frac{7}{24}\right) = \tan^{-1}\left(\frac{1}{2}\right)$



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321. Prove that : $\tan^{-1} 2 + \tan^{-1} 3 = \frac{3\pi}{4}$



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322. Prove that : $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3 = \pi$



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323. Prove that: $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$



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324. If $\tan^{-1} 2 + \tan^{-1} 3 + \theta = \pi$, find the value of θ .

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325. Find $\frac{dy}{dx}$ if $x - 2y = \sin y$

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

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327. Find value of $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right)$

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328. Prove 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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329. Prove that : $\cot^{-1} 7 + \cot^{-1} 8 + \cot^{-1} 18 = \cot^{-1} 3$

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330. Simplify each of the following: $\tan^{-1}\left(\frac{a + bx}{b - ax}\right)$

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331. Prove that:

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

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332. If $a > b > c > 0$, prove that

$$\cot^{-1}\left(\frac{ab+1}{a-b}\right) + \cot^{-1}\left(\frac{bc+1}{b-c}\right) + \cot^{-1}\left(\frac{ca+1}{c-a}\right) = \pi$$

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

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334. Solve : $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$

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335. Solve: $\tan^{-1}\left(\frac{x-1}{x+1}\right) + \tan^{-1}\left(\frac{2x-1}{2x+1}\right) = \tan^{-1}\left(\frac{23}{36}\right)$

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336. If $a, b, c > 0$ such that $a + b + c = abc$, find the value of $\tan^{-1} a + \tan^{-1} b + \tan^{-1} c$.

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337. Evaluate $\int (2 - x)(5 - x) dx$

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338. If $a_1, a_2, a_3, \dots, a_n$ are in arithmetic progression with common difference d , then evaluate the following expression:

$$\tan \left\{ \tan^{-1} \left(\frac{d}{1 + a_1 a_2} \right) + \tan^{-1} \left(\frac{d}{1 + a_2 a_3} \right) + \tan^{-1} \left(\frac{d}{1 + a_3 a_4} \right) + \dots \right\}$$

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339. Prove that: $\sum_{m=1}^n \tan^{-1} \left(\frac{2m}{m^4 + m^2 + 2} \right) = \tan^{-1} \left(\frac{n^2 + n}{n^2 + n + 2} \right)$



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340. Sum the following series to infinity :

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



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

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



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342. If $\tan^{-1} \frac{yz}{xr} + \tan^{-1} \frac{zx}{yr} + \tan^{-1} \frac{xy}{zr} = \frac{\pi}{2}$, prove that ,

$$x^2 + y^2 + z^2 = r^2$$



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343. If $a, b, c > 0$ and $s = \frac{a + b + c}{2}$, prove that

$$\tan^{-1} \sqrt{\frac{2as}{bc}} + \tan^{-1} \sqrt{\frac{2bs}{ca}} + \tan^{-1} \sqrt{\frac{2cs}{ab}} = \pi$$

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344. Simplify $\tan^{-1} \left[\frac{3 \sin 2\alpha}{5 + 3 \cos 2\alpha} \right] + \tan^{-1} \left[\frac{\tan \alpha}{4} \right]$

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

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346. Evaluate $\int 5e^{7x} dx$

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347. Prove that: $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$

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348. Evaluate $\int x^5(2-x)dx$

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

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350. Solve for x: $\tan^{-1} 3x + \tan^{-1} 2x = \frac{\pi}{4}$

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351. Evaluate $\int(3-x).x^2dx$



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352. Evaluate $\int(x^2 - x + 1) dx$



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353. Evaluate $\int(e^x + x^4 + 2x) dx$



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354. Solve for x : $\cot^{-1} x - \cot^{-1}(x + 2) = \frac{\pi}{12}$, where $x > 0$



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355. Evaluate $\int x \cdot \cos x dx$



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356. Evaluate $\int 5x - 2 dx$

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

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358. Evaluate $\int (7x^2 - 5x) dx$

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

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360. Find the sum of the series :

$$\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{2}{9}\right) + \dots + \tan^{-1}\left(\frac{2^{n-1}}{1+2^{2n-1}}\right) + \dots \infty$$

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361. Prove that :

$$\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1}\left(\frac{77}{85}\right) = \tan^{-1}\left(\frac{77}{36}\right)$$

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

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363. Prove each of the following

$$\sin^{-1}\left(\frac{3}{5}\right) + \sin^{-1}\left(\frac{8}{17}\right) = \sin^{-1}\left(\frac{77}{85}\right)$$

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

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365. Prove that $\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \cos^{-1}\left(\frac{36}{85}\right)$

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366. Show that

$$\sin^{-1}\left(\frac{3}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{33}{65}\right) = \sin^{-1}\left(\frac{56}{65}\right)$$

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367. $\frac{\sin^{-1}(3x)}{5} + \frac{\sin^{-1}(4x)}{5} = \sin^{-1}x$, then roots of the equation are- a.0 b. 1 c. -1 d. -2

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368. Solve the equation $\sin^{-1} x + \sin^{-1} 6\sqrt{3}x = \frac{-\pi}{2}$.

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

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370. Prove that: $\sin^{-1}\left(\frac{63}{65}\right) = \sin^{-1}\left(\frac{5}{13}\right) + \cos^{-1}\left(\frac{3}{5}\right)$

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371. Prove that: $\frac{\tan^{-1}(63)}{16} = \frac{\sin^{-1} 5}{13} + \frac{\cos^{-1} 3}{5}$

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372. Prove that: $\frac{9\pi}{8} - \frac{9}{4} \frac{\sin^{-1} 1}{3} = \frac{9}{4} \frac{\sin^{-1}(2\sqrt{2})}{3}$

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373. solve: $\sin^{-1} x + \sin^{-1} 2x = \frac{\pi}{3}$

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

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375. Show that $\sin^{-1}\left(\frac{3}{5}\right) - \sin^{-1}\left(\frac{8}{17}\right) = \cos^{-1}\left(\frac{84}{85}\right)$.

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

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

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377. If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = \pi$, prove that

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

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378. If $\cos^{-1}\left(\frac{x}{2}\right) + \cos^{-1}\left(\frac{y}{3}\right) = \alpha$ then prove that

$$9x^2 - 12xy\cos\alpha + 4y^2 = 36\sin^2\alpha.$$

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379. Solve the equation:

$$\cos^{-1}\left(\frac{a}{x}\right) - \cos^{-1}\left(\frac{b}{x}\right) = \cos^{-1}\left(\frac{1}{b}\right) - \cos^{-1}\left(\frac{1}{a}\right)$$



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



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



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382. Evaluate: $\sin(2 \sin^{-1} 0.6)$



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383. Evaluate: $\sin(3 \sin^{-1} 0.4)$



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384. Prove the following:

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

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385. Evaluate $\int \sin 7x dx$

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386. Evaluate: $\int 200x^2 dx$

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387. find $\frac{dy}{dx}$ if $y = e^x + \log 2x$

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388. Find $\frac{dy}{dx}$ if $x^2y - 2y = x$

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389. Find the value of $\frac{dy}{dx}$ if $xy = \sin y + \cos y$

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390. Show that $2 \tan^{-1}(-3) = -\frac{\pi}{2} + \tan^{-1}\left(-\frac{4}{3}\right)$

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

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

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394. Differentiate $\tan^{-1}\left(\frac{3a^2x - x^3}{a^3 - 3ax^2}\right)$

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395. $4 \tan^{-1}\left(\frac{1}{5}\right) = \tan^{-1}\left(\frac{1}{70}\right) + \tan^{-1}\left(\frac{1}{99}\right) + \frac{\pi}{4}$

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396. Prove that: $2\frac{\tan^{-1} 1}{5} + \frac{\sec^{-1}(5\sqrt{2})}{7} + 2 \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$

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



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398. Solve for x : $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$



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



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400. Solve: $\sin\left[2\cos^{-1}\left\{\cot\left(2\tan^{-1}x\right)\right\}\right] = 0$



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401. Solve the following equation: $\sin^{-1} x + \sin^{-1}(1 - x) = \cos^{-1} x$

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402. Evaluate $\int \frac{2x}{1 - x^2} dx$

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403. 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) $-\sqrt{3}$

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404. Evaluate $\int (5 - x) \cdot x^2 dx$

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405. Evaluate $\int (2 - x) \cdot x^3 dx$



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406.

Show

that

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



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407.

Prove

that:

$$\frac{\alpha^3}{2} \sec^2 \left(\frac{1}{2} \tan^{-1} \left(\frac{\alpha}{\beta} \right) \right) + \frac{\beta^3}{2} \sec^2 \left(\frac{1}{2} \tan^{-1} \left(\frac{\beta}{\alpha} \right) \right) = (\alpha + \beta) (\alpha^2 + \beta^2)$$



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408.

Prove

that

:

$$\tan^{-1} \left\{ \frac{\cos 2\alpha \sec 2\beta + \cos 2\beta \sec 2\alpha}{2} \right\} = \tan^{-1} \{ \tan^2(\alpha + \beta) \tan^2(\alpha - \beta) \}$$



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409. Evaluate the following: (i) $\tan\left\{2 \tan^{-1}\left(\frac{1}{5}\right) - \frac{\pi}{4}\right\}$ (ii)
 $\tan\left(\frac{1}{2} \sin^{-1}\left(\frac{3}{4}\right)\right)$



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410. Evaluate the following: (i) $\sin\left(\frac{1}{2} \cos^{-1}\left(\frac{4}{5}\right)\right)$ (ii)
 $\sin\left(2 \tan^{-1}\left(\frac{2}{3}\right)\right) + \cos(\tan^{-1} \sqrt{3})$



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



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412. Prove the following:

$$\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right) = \frac{1}{2}\sin^{-1}\left(\frac{4}{5}\right)$$

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413. Prove: $\tan^{-1}\left(\frac{2}{3}\right) = \frac{1}{2}\tan^{-1}\left(\frac{12}{5}\right)$

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414. Prove the following: $\frac{\tan^{-1} 1}{7} + 2 \frac{\tan^{-1} 1}{3} = \frac{\pi}{4}$

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

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416. Prove that $2 \sin^{-1} \left[\frac{3}{5} \right] - \tan^{-1} \left[\frac{17}{31} \right] = \frac{\pi}{4}$

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417. Prove the following: $2 \tan^{-1} \left(\frac{1}{5} \right) + \tan^{-1} \left(\frac{1}{8} \right) = \tan^{-1} \left(\frac{4}{7} \right)$

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418. Prove the following: $2 \tan^{-1} \left(\frac{3}{4} \right) - \tan^{-1} \left(\frac{17}{31} \right) = \frac{\pi}{4}$

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

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420. Prove the following: $4 \tan^{-1} \left(\frac{1}{5} \right) - \tan^{-1} \left(\frac{1}{239} \right) = \frac{\pi}{4}$

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

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

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

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

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425. Show that $2 \tan^{-1} x + \sin^{-1} \left(\frac{2x}{1+x^2} \right)$ is constant for $x \geq 1$, find that constant.

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

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427. Find the value of $\cos \left(\sec^{-1} x + \operatorname{cosec}^{-1} x \right)$, $|x| \geq 1$

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428. Find the value of $\tan^{-1} \left(\frac{x-2}{x-1} \right) + \tan^{-1} \left(\frac{x+2}{x+1} \right) = \frac{\pi}{4}$

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429. Solve the following equation for x :

$$\tan^{-1}\left(\frac{1}{4}\right) + 2\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{6}\right) + \tan^{-1}\left(\frac{1}{x}\right) = \frac{\pi}{4}$$

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430. Solve

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

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431. Solve the following equation for x :

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

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432. Solve for x : $2\tan^{-1}(\sin x) = \tan^{-1}(2\sec x)$, $x \neq \frac{\pi}{2}$

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433. Solve for x : $\cos^{-1}\left(\frac{x^2 - 1}{x^2 + 1}\right) + \frac{1}{2}\tan^{-1}\left(\frac{2x}{1 - x^2}\right) = \frac{2\pi}{3}$

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

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435. Show that $(\tan^{-1})\frac{2ab}{a^2 - b^2} + (\tan^{-1})\frac{2xy}{x^2 - y^2} = (\tan^{-1})\frac{2\alpha\beta}{\alpha^2 - \beta^2}$, where $\alpha = ax - by$ and $\beta = ay + bx$.

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436. For any $a, b, x, y > 0$, prove that $\frac{2}{3}\tan^{-1}\left(\frac{3ab^2 - a^3}{b^3 - 3a^2b}\right) + \frac{2}{3}\tan^{-1}\left(\frac{3xy^2 - x^3}{y^3 - 3x^2y}\right) = \frac{\tan^{-1}(2\alpha\beta)}{\alpha^2 - \beta^2}$,

where $\alpha = -ax + by$ $\beta = bx + ay$.

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437. Write the value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)$.

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438. Write the difference between maximum and minimum values of $\sin^{-1}x$ for $x \in [-1, 1]$.

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439. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \frac{3\pi}{2}$, then write the value of $x + y + z$.

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440. If $x > 1$, then write the value of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ in terms of $\tan^{-1}x$

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

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442. Write the value of $\tan^{-1}x + \tan^{-1}\left(\frac{1}{x}\right)$ for $x > 0$

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443. Write the value of $\tan^{-1}x + \tan^{-1}\left(\frac{1}{x}\right)$ for $x < 0$

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

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

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

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

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448. The range of $\tan^{-1} x$ is



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449. Write the value of $\cos^{-1}(\cos 1540^\circ)$.



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450. Evaluate each of the following: $\sin^{-1}(\sin(-600^\circ))$ (ii)
 $\cos^{-1}(\cos(-680^\circ))$



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451. Write the value of $\cos\left(2 \frac{\sin^{-1} 1}{3}\right)$.



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452. Write the value of $\sin^{-1}(\sin 1550^\circ)$



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

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454. Evaluate: $\sin\left(\tan^{-1}\left(\frac{3}{4}\right)\right)$

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455. Write the value of $\cos^{-1}\left(\tan\left(\frac{3\pi}{4}\right)\right)$.

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456. Write the value of $\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)$

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457. Write the value of $\cos^{-1}(\cos 350^\circ) - \sin^{-1}(\sin 350^\circ)$

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458. Write the value of $\cos^2\left(\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)\right)$

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459. If $\tan^{-1}x + \tan^{-1}y = \frac{\pi}{4}$, then write the value of $x + y + xy$.

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460. Write the value of $\cos^{-1}(\cos 6)$.

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461. Write the value of $\sin^{-1}\left(\cos\left(\frac{\pi}{9}\right)\right)$.

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

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463. Write the value of $\tan^{-1} \left\{ \tan \left(\frac{15\pi}{4} \right) \right\}$

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

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465. Write the value of $\tan^{-1} \left(\frac{a}{b} \right) - \tan^{-1} \left(\frac{a-b}{a+b} \right)$

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466. Write the value of $\cos^{-1}\left(\cos\left(5\frac{\pi}{4}\right)\right)$.

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467. Show that $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}x$

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

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469. If $\tan^{-1}(\sqrt{3}) + \cot^{-1}x = \frac{\pi}{2}$, find x .

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470. If $\sin^{-1}\left(\frac{1}{3}\right) + \cos^{-1}x = \frac{\pi}{2}$, then find x



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471. Write the value of $\sin^{-1}\left(\frac{1}{3}\right) - \cos^{-1}\left(-\frac{1}{3}\right)$.



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472. If $4 \sin^{-1} x + \cos^{-1} x = \pi$, then what is the value of x ?



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473. If $x < 0$, $y < 0$ such that $xy = 1$, then write the value of $\tan^{-1} x + \tan^{-1} y$.



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



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

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476. Write the principal value of $\cos^{-1}\left(\frac{\cos(2\pi)}{3}\right) + \sin^{-1}\left(\frac{\sin(2\pi)}{3}\right)$

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477. Write the value of $\tan\left(2 \tan^{-1}\left(\frac{1}{5}\right)\right)$.

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

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

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480. Write the principal value of $\tan^{-1} \sqrt{(3)} - \cot^{-1} \sqrt{(-3)}$.

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481. Write the principal value of $\cos^{-1} [\cos (680^\circ)]$.

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

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483. Write the value of $\sec^{-1} \left(\frac{1}{2} \right)$.



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484. The value of $\cos^{-1}(\cos(14\pi)/(3))$ is



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485. Write the value of $\cos(\sin^{-1} x + \cos^{-1} x)$, $|x| \leq 1$.



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486. The value of $\tan\left(\frac{\sin^{-1} x + \cos^{-1} x}{2}\right)$, when $x = \frac{\sqrt{3}}{2}$, is



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487. The principal value of $\sin^{-1}\left[\cos\left(\sin^{-1}\left(\frac{1}{2}\right)\right)\right]$ is



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488. Find the set of values of $\operatorname{cosec}^{-1}\left(\frac{\sqrt{3}}{2}\right)$

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489. Write the value of $\tan^{-1}\left(\frac{1}{x}\right)$ for $x < 0$ in terms of $\cot^{-1}(x)$.

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490. The value of $\cot^{-1}(-x)$, $x \in \mathbb{R}$ in terms of $\cot^{-1} x$ is

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491. Write the value of $\cos\left(\frac{\tan^{-1} x + \cot^{-1} x}{3}\right)$, when $x = -\frac{1}{\sqrt{3}}$.

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492. If $\cos(\tan^{-1} x + \cot^{-1} \sqrt{3}) = 0$, find the value of x .

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

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494. If $\cos \left(\frac{\sin^{-1} 2}{5} + \cos^{-1} x \right) = 0$ find the value of x .

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495. Find the value of the following: $\cos^{-1} \left(\cos \left(\frac{13\pi}{6} \right) \right)$

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496. 8. Find the principal value of $\tan^{-1}\left(\frac{\tan(9\pi)}{8}\right)$

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497. If $\tan^{-1}\left\{\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right\} = \alpha$, then $x^2 = \sin 2\alpha$ (b) $\sin \alpha$

(c) $\cos 2\alpha$ (d) $\cos \alpha$

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498. The value of $\tan\left\{\frac{\cos^{-1}1}{5\sqrt{2}} - \frac{\sin^{-1}4}{\sqrt{17}}\right\}$ is $\frac{\sqrt{29}}{3}$ (b) $\frac{29}{3}$ (c) $\frac{\sqrt{3}}{29}$ (d) $\frac{3}{29}$

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





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500. If $\frac{\cos^{-1} x}{a} + \frac{\cos^{-1} y}{b} = \alpha$, prove that

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



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

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



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502. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then $x =$ (a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $-\frac{1}{2}$ (d)

none of these



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503. $\sin[\cot^{-1}\{\tan(\cos^{-1} x)\}]$ is equal to (a) x (b) $\sqrt{1-x^2}$ (c) $\frac{1}{x}$ (d)

None of these

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504. The number of solutions of equation $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$ is

(a) 2 (b) 3 (c) 1 (d) none of these

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505. If $\alpha = \tan^{-1}\left(\tan\frac{5\pi}{4}\right)$ and $\beta = \tan^{-1}\left(-\tan\left(\frac{2\pi}{3}\right)\right)$, then (a) $4\alpha = 3\beta$ (b) $3\alpha = 4\beta$ (c) $\alpha - \beta = 74\alpha = \frac{3\beta}{12}$ (d) none of these

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506. The number of real solutions of the equation

$\sqrt{1 + \cos 2x} = \sqrt{2} \sin^{-1}(\sin x)$, $-\pi \leq x \leq \pi$ is (a) 0 (b) 1 (c) 2 (d)

infinite



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507. If $x < 0$, $y < 0$ such that $xy = 1$, then $\tan^{-1} x + \tan^{-1} y$ equals

$\frac{\pi}{2}$ (b) $-\frac{\pi}{2}$ (c) π (d) none of these



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508. If $u = \cot^{-1} \sqrt{\tan \alpha} - \tan^{-1} \sqrt{\tan \alpha}$, then $\tan\left(\frac{\pi}{4} - \frac{u}{2}\right)$ is equal to (a) $\sqrt{\tan \alpha}$ (b) $\sqrt{\cos \alpha}$ (c) $\tan \alpha$ (d) $\cot \alpha$



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509. If $\frac{\cos^{-1} x}{3} + \frac{\cos^{-1} y}{2} = \frac{\theta}{2}$, then $4x^2 - 12xy \frac{\cos \theta}{2} + 9y^2 =$ (a) 36 (b) $36 - 36 \cos \theta$ (c) $18 - 18 \cos \theta$ (d) $18 + 18 \cos \theta$



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510. If $\alpha = \tan^{-1}\left(\frac{\sqrt{3}x}{2y-x}\right)$, $\beta = \tan^{-1}\left(\frac{2x-y}{\sqrt{3}y}\right)$, then $\alpha - \beta =$

- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{3}$

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511. Let $f(x) = e^{\cos^{-1}((-1))\left\{\sin\left(x + \frac{\pi}{3}\right)\right\}}$. Then, $f\left(\frac{8\pi}{9}\right) = e^{5\pi/18}$

- (b) $e^{13\pi/18}$ (c) $e^{-2\pi/18}$ (d) none of these

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512. $\tan^{-1}\left(\frac{1}{11}\right) + \tan^{-1}\left(\frac{2}{11}\right)$ is equal to (a) 0 (b) $1/2$ (c) -1 (d) none of these

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513. If $\frac{\cos^{-1}x}{2} + \frac{\cos^{-1}y}{3} = \theta$, then $9x^2 - 12xy\cos\theta + 4y^2$ is equal to

- (a) 36 (b) $-36\sin^2\theta$ (c) $36\sin^2\theta$ (d) $36\cos^2\theta$



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



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



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516. The value of $\cos^{-1} \left(\cos \left(\frac{5\pi}{3} \right) \right) + \sin^{-1} \left(\sin \left(\frac{5\pi}{3} \right) \right)$ is (a) $\frac{\pi}{2}$ (b) $\frac{5\pi}{3}$ (c) $\frac{10\pi}{3}$ (d) 0



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517. $\sin\left\{2 \cos^{-1}\left(-\frac{3}{5}\right)\right\}$ is equal to (a) $6/25$ (b) $24/25$ (c) $4/5$ (d) $-24/25$

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518. If $\theta = \sin^{-1}\{\sin(-600^\circ)\}$, then $\theta \neq$ of the possible values of θ is $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) $-\frac{2\pi}{3}$

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

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520. If $4 \cos^{-1} x + \sin^{-1} x = \pi$, then the value of x is (a) $\frac{3}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{2}{\sqrt{3}}$



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



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



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523. In a triangle ABC , if C is a right angle, then $\tan^{-1}\left(\frac{a}{b+c}\right) + \tan^{-1}\left(\frac{b}{c+a}\right) =$ (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{5\pi}{2}$ (d) $\frac{\pi}{6}$



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524. The value of $\sin\left(\frac{1}{4}\sin^{-1}\left(\frac{\sqrt{63}}{8}\right)\right)$ is (a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\frac{1}{2\sqrt{2}}$ (d) $\frac{1}{3\sqrt{3}}$

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525. Prove that $\cot\left(\frac{\pi}{4} - 2\cot^{-1}3\right) = 7$

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526. If $\tan^{-1}(\cot \theta) = 2\theta$, then $\theta =$ (a) $\pm \frac{\pi}{3}$ (b) $\pm \frac{\pi}{4}$ (c) $\pm \frac{\pi}{6}$ (d) none of these

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527. If $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \cos^{-1}\left(\frac{1-a^2}{1+a^2}\right) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $a, x \in]0, 1[$, then the value of x is

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528. The value of $\sin(2 \tan^{-1}(0.75))$ is equal to (a) 0.75 (b) 1.5 (c) 0.96 (d) $\sin^{-1} 1.5$

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

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530. The domain of $\cos^{-1}(x^2 - 4)$ is

A. a. $[3, 5]$

B. b. $[-1, 1]$

C. c. $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$

D. d. $[-\sqrt{5}, -\sqrt{3}] \cap [-\sqrt{5}, \sqrt{3}]$

Answer: null

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531. The value of $\tan\left(\cos^{-1}\left(\frac{3}{5}\right) + \tan^{-1}\left(\frac{1}{4}\right)\right)$ is (a) $\frac{19}{8}$ (b) $\frac{8}{19}$ (c) $\frac{19}{12}$ (d) $\frac{3}{4}$

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