MATHS

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INVERSE TRIGONOMETRIC FUNCTIONS

Worked Examples

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

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2. Find the principal value of $\sin^{-1}(3)$, if it exist

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3. Find the principal value of

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

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4. Find the principal value of

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

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5. Find the principal value of

$$\sin^{-1}\left[\sin\left(\frac{5\pi}{6}\right)\right]$$

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6. Find the domain of $\sin^{-1}(2-3x^2)$.

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

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8. Find

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

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9. Find

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

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10. Find

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

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11. Find the domain of

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

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12. Find the principal value of

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

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13. Find (i) $\tan^{-1}(-1)$

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

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15. Find $\tan\tan^{-1}(2020)$

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16. Evaluate the value of

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

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

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18. Find the principal value of

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

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19. Find the principal value of

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

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20. Find the principal value of

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

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

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

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23. If $\cos^{-1}\left(\frac{1}{5\sqrt{2}}\right) = \theta$ find the value of $\sin\theta$ and $\cot\theta$

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24. Show that $\text{cosec}^{-1}\left(\frac{x}{\sqrt{x^2-1}}\right) = \sec^{-1}(x), |x| > 1$

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25. Prove that $\frac{\pi}{2} \leq \tan^{-1} x + 2\cot^{-1} x \leq \frac{3\pi}{2}$

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26. Simplify $\tan^{-1}\left(\tan.\ \frac{5\pi}{6}\right)$

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27. Simplify $\cos^{-1}\cos\left(\frac{19\pi}{3}\right)$

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28. Simplify $\sin^{-1}\left(\sin.\ \frac{\pi}{6}\right)$

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29. Simplify $\sec^{-1}\sec\left(\frac{11\pi}{3}\right)$

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30. Simplify

$\sin^{-1}(\sin 20)$

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31. Find the value of

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

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

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33. Find the value of

$$\tan\left[\frac{1}{2}\text{cosec}^{-1}\left(\frac{1+x^2}{2x}\right)+\frac{1}{2}\sec^{-1}\left(\frac{1+x^2}{1-x^2}\right)\right]$$

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34. Prove that

$$\cot\left(\cos^{-1} x\right) = \frac{x}{\sqrt{1-x^2}} |x| < 1$$

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35. Evaluate

$$\sin\left[\sin^{-1}\left(\frac{5}{13}\right) + \tan^{-1}\left(\frac{5}{12}\right)\right]$$

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36. Prove that :

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

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37. Prove that :

$$2\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{6}\right)=\tan^{-1}\left(\frac{22}{21}\right)$$

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38. If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=\pi$ and $0<x,y,z<1$ show that

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

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39. Show that

$$\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{1}{8}\right)=\tan^{-1}\left(\frac{3}{4}\right)-\tan^{-1}\left(\frac{1}{18}\right)$$

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40. Solve :

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

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41. Solve :

$$\sin^{-1}x>\cos^{-1}x$$

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42. Show that :

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

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43. Solve :

$$\tan^{-1} 3x + \tan^{-1} 4x = \tan^{-1}\left(\frac{1}{x}\right), 12x^2 < 1, x \neq 0$$

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44. Solve :

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

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45. Solve :

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

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Solved To Exercise 4 1

1. Find all the values of x such that

$-10\pi \leq x \leq 10\pi \text{ and } \sin x = 0$

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2. Find all the values of x such that

$-8\pi \leq x \leq 8\pi \text{ and } \sin x = -1$

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3. Find the period and amplitude of

$y = \sin 7x$

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4. Find the period and amplitude of

$y = -\sin\left(\frac{1}{3}x\right)$

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5. Find the period and amplitude of

$y = 4\sin(-2x)$

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6. Sketch the graph of $y = \sin\frac{1}{3}x \quad \text{for} \quad 0 \leq x \leq 6\pi.$

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7. Find the value of

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

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8. Find the value of

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

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9. For what values of x, does $\sin x = \sin^{-1} x$?

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10. Find the domain of the following

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

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11. Find the domain of the following

$$g(x) = 2\sin^{-1}(2x-1) - \frac{\pi}{4}$$

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12. Find the value of

$$\sin^{-1}\left(\sin\frac{5x}{9}\cos\frac{\pi}{9}+\cos\frac{5x}{9}\sin\frac{x}{9}\right)$$

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Solved To Exercise 4 2

1. Find all values of x such that

$$-6\pi \leq x \leq 6\pi \text{ and } \cos x = 0$$

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2. Find all values of x such that

$$-5\pi \leq x \leq 5\pi \text{ and } \cos x = 1$$

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3. State the reason for $\cos^{-1}\left[\cos\left(\frac{-\pi}{6}\right)\right] \neq \frac{-\pi}{6}$

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4. Is $\cos^{-1}(-x) = \pi - \cos^{-1} x$ true ? Justify your answer.

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5. Find the principal values of $\cos^{-1}\frac{1}{2}$

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6. Find the value of

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

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7. Find the value of

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

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8. Find the value of

$$\left(\cos.\frac{\pi}{7}\cos.\frac{\pi}{17}-\sin.\frac{\pi}{7}\sin.\frac{\pi}{17}\right)$$

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9. Find the domain of

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

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10. Find the domain of

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

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11. For what values x, the inequality $\frac{\pi}{2} < \cos^{-1}(3x - 1) < \pi$ hold ?

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12. Find the value of

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

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13. Find the value of

$$\cos^{-1}\left(\cos\left(\frac{4\pi}{3}\right)\right)+\cos^{-1}\left(\cos\left(\frac{5\pi}{4}\right)\right)$$

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Solved To Exercise 4 3

1. Find the domain of the following functions :

$$\tan^{-1}\sqrt{9-x^2}$$

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2. Find the domain of the following functions :

$$\frac{1}{2}\tan^{-1}(1-x^2)-\frac{\pi}{4}$$

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3. Find the value of

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

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4. Find the value of

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

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5. Find the value of

$$\tan\left(\tan^{-1}\left(\frac{7\pi}{4}\right)\right)$$

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6. Find the value of

$$\tan\left(\tan^{-1}(1947)\right)$$

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7. Find the value of

$$\tan\left(\tan^{-1}(-0.2.21)\right)$$

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8. Find the value of

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

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9. Find the value of

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

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10. Find the value of

$$\cos\left[\sin^{-1}\left(\frac{4}{5}\right)-\tan^{-1}\left(\frac{3}{4}\right)\right]$$

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Solved To Exercise 4 4

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

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2. Find the principal value of -2i

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3. Find the principal value of

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

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4. Find the value of

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

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5. Find the value of

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

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6. Find the value of

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

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Solved To Exercise 4 5

1. Find the value, it exists. If not give the reson for non-existence.

$\sin^{-1}(\sin 5)$

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2. Find the value, it exists. If not give the reson for non-existence.

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

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3. Find the value, it exists. If not give the reson for non-existence.

$\sin^{-1}(\sin 5)$

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4. Find the value of the expression in terms of x, with the help of a reference triangle.

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

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5. Find the value of the expression in terms of x, with the help of a reference triangle.

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

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6. Find the value of the expression in terms of x, with the help of a reference triangle.

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

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7. Find the value of

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

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8. Find the value of

$$\cot^{-1}\left(\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{4}{5}\right)$$

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9. Find the value of

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

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10. Prove thate

$$\tan^{-1}\left(\frac{2}{11}\right)+\tan^{-1}\left(\frac{7}{24}\right)=\tan^{-1}\left(\frac{1}{2}\right)$$

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11. Prove thate

$$\sin^{-1}\left(\frac{3}{5}\right) - \cos^{-1}\left(\frac{12}{13}\right) = \sin^{-1}\left(\frac{16}{65}\right)$$

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12. Prove that

$$\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \tan^{-1}\left(\frac{x + y + z - xyz}{1 - xy - yz - zx}\right)$$

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13. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, show that x + y + z = xyz.

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14. Prove that $\tan^{-1} x + \tan^{-1} \frac{2x}{1-x^2} = \tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right) |x| < \frac{1}{\sqrt{3}}.$

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15. Simplify : $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right).$

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16. Solve

$$\sin^{-1}\left(\frac{5}{x}\right) + \sin^{-1}\left(\frac{12}{x}\right) = \frac{\pi}{2}$$

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17. Solve

$$2\tan^{-1}x = \cos^{-1}\frac{1-a^2}{1+a^2} - \cos^{-1}\frac{1-b^2}{1+b^2}, a > 0, \ > 0$$

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18. Solve :

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

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19. Solve

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

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20. Find the number of solution of the eqution $\tan^{-1}(x-1)+\tan^{-1}x+\tan^{-1}(x+1)=\tan^{-1}(3x)$

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Solved To Exercise 4 6

1. The value of $\sin^{-1}(\cos x), 0 \leq x \leq \pi$ is :

A. $\pi - x$

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

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

D. $\pi - x$

Answer: C

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

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

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

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

D. π

Answer: B

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3. $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} + \sec^{-1}\frac{5}{3} - \cos ec^{-1}\frac{13}{12}$ is equal to

A. 2π

B. π

C. 0

D. $\tan^{-1}.\frac{12}{65}$

Answer: C

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4. If $\sin^{-1}x = 2\sin^{-1}\alpha$ has a solution, then

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

B. $|\alpha| \geq \frac{1}{\sqrt{2}}$

C. $|\alpha| < \frac{1}{\sqrt{2}}$

D. $|\alpha| > \frac{1}{\sqrt{2}}$

Answer: A

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5. $\sin^{-1}(\cos x) = \frac{\pi}{2} - x$ is valid for

A. $-\pi \leq x \leq 0$

B. $0 \leq x \leq \pi$

C. $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

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

Answer: B

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6. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, the value of $x^{2017} + y^{2018} + z^{2019} - \frac{9}{x^{101} + y^{101} + z^{101}}$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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7. If $\cot^{-1} x = \frac{2\pi}{5}$ for some $x \in R$, the value of $\tan^{-1} x$ is

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

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

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

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

Answer: C

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8. The domain of the function defined by $f(x) = \sin^{-1}\sqrt{x-1}$ is

A. $[1, 2]$

B. $[-1, 1]$

C. $[0, 1]$

D. $[-1, 0]$

Answer: A

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

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

B. $\sqrt{\frac{24}{25}}$

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

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

Answer: D

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

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

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

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

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

Answer: D

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11. If the function $f(x) = \sin^{-1}(x^2 - 3)$ then x belongs to

A. $[-1, 1]$

B. $[\sqrt{2}, 2]$

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

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

Answer: C

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12. If $\cot^{-1} 2$ and $\cot^{-1} 3$ are two anges of a triangle, then the third angle is

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

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

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

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

Answer: B

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13. $\sin^{-1}\left[\tan\frac{\pi}{4}\right] - \sin^{-1}\left[\sqrt{\frac{3}{x}}\right] = \frac{\pi}{6}$. Then x is a root of the equation

A. $x^2 - x - 6 = 0$

B. $x^2 - x - 12 = 0$

C. $x^2 + x - 12 = 0$

D. $x^2 + x - 6 = 0$

Answer: B

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

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

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

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

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

Answer: A

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15. If

$\cot^{-1}\left(\sqrt{\sin\alpha}\right) + \tan^{-1}\left(\sqrt{\sin\alpha}\right) = u$, then $\cos 2u$ is equal to

A. $\tan^2\alpha$

B. 0

C. -1

D. $\tan 2\alpha$

Answer: C

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

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

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

C. 0

D. π

Answer: C

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17. The equation $\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ has

A. no solution

B. unique solution

C. two solutions

D. infinite number of solutions

Answer: C

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18. If $\sin^{-1} x + \cot^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{2}$, then x is equalt to

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

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

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

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

Answer: B

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

A. 4

B. 5

C. 2

D. 3

Answer: D

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

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

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

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

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

Answer: D

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Problems For Practice Choose The Correct Answer

1. If $\cot^{-1} x = \frac{2\pi}{7}$ for some $x \in R$ the value of $\tan^{-1} x$ is

:

A. $\frac{3\pi}{14}$

B. $\frac{-3\pi}{14}$

C. $\frac{7\pi}{12}$

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

Answer: A

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2. If $\sin^{-1} x = 3\sin^{-1} \alpha$ has a solution then :

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3.

$$\sin^{-1}\left(\frac{4}{5}\right)+\cos^{-1}.\frac{5}{13}+\sec^{-1}\left(\frac{5}{4}\right)+\operatorname{cosec}^{-1}\left(\frac{13}{5}\right)$$

is :

A. pi

B. 0

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

D. $-\pi$

Answer:

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4. $\cos\left(\tan^{-1}\left(\frac{3x}{2}\right)\right)$ is :

A. $\frac{3x}{\sqrt{4+9x^2}}$

B. $\frac{2}{\sqrt{9x^2-4}}$

C. $\frac{2}{\sqrt{4-9x^2}}$

D. $\frac{2}{\sqrt{4+9x^2}}$

Answer: D

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5. $\tan^{-1}x+\tan^{-1}y=\frac{3\pi}{4}$ Then $\cot^{-1}x+\cot^{-1}y$ is :

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

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

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

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

Answer: C

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6. $\lim_{x \to 0} \frac{1}{x} \cos^1\left(\frac{1-x^2}{1+x^2}\right)$ is equal to

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

B. 0

C. 1

D. -1

Answer: B

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7. If $\cos^{-1} x + \cot^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{2}$ then x is equal to

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

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

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

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

Answer: C

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8. $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \tan^{-1}(\theta)$ then θ is

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

B. π

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

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

Answer: C

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9. $\cos\left(\sin^{-1}\left(\frac{x}{\sqrt{1+x^2}}\right)\right)$ is :

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

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

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

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

Answer: A

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10. $\cot^{-1}\left(\frac{3}{4}\right) = \sin^{-1}\left(\frac{x}{5}\right)$ then x is :

A. -4

B. -3

C. 4

D. 3

Answer: C

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11. $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) = k\tan^{-1}x$ then k is :

A. -1

B. 2

C. -2

D. 1

Answer: B

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12. Choose the correct statement from the following

A. y = sec x is an odd function

B. The perioed of $y = \cos 6x + \sin 4x$ is π

C. The principal domain of sine function $(0, \pi)$

D. $\sin^{-1}(\sin 2\pi) = 2\pi$

Answer: b

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13. Choose the correct statement fom the following :

A. y = sin x is an even function

B. The principal domain of cosine function is $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

C. The period of $y = \cos x$ is π

D. $y = \cos^{-1} x$ is neither even or odd function .

Answer: d

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14. Choose the incorrect statement

A. $\tan^{-1}(\tan x) = x$ if and only if $\frac{-\pi}{2} < x < \frac{\pi}{2}$

B. The principal value of $\tan^{-1}\sqrt{3}$ is $\frac{\pi}{3}$

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

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

Answer: d

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15. Find the incorrect statement in the following

A. $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}, x \in [-1, 1]$

B. $\tan^{-1}(x) = \cot^{-1}\left(\frac{1}{x}\right)$ if $x > 0$

C. $\tan^{-1}(-x) = -\tan^{-1} x$ if $x \in R$

D. $\tan^{-1} x + \tan^{-1} y = \tan^{-1}\left(\frac{1-xy}{x+y}\right)$

Answer: d

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16. Match the following :

16.	$\lvert \text{adj } A \rvert$	(a) $\frac{\text{Adj } A}{\det A}$
17.	$\lvert A^{-1} \rvert$	(b) $B^{-1}A^{-1}$
18.	If A and B are orthogonal matrices $(AB)^T$	(c) $\frac{1}{\lvert A \rvert}$
19.	A^{-1}	(d) A
20.	$(A^{-1})^{-1}$	(e) $\lvert A \rvert^{n-1}$

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17. Find the correct pair in the following statement :

y = tan x is a periodic function with period π

Domain of cosecant function is R

The period of $f = g \pm h$ is l.c.m of period of g , period of h

$\text{cosec}^{-1} x + \sec^{-1} x = \frac{\pi}{4}$

A. (i) and (ii)

B. (i) and (iii)

C. (i) and (iv)

D. (ii) and (iv)

Answer: b

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18. Find the odd one out

Range of trigonometric functions $(\sin x, \cos x, \tan x, \sec x, \operatorname{cosec} x, \cot x)$ can be :

A. $[-1, 1]$

B. R

C. $R/(-1,1)$

D. $R/[-1,1]$

Answer: d

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19. Find the odd one out

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

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

C. $\text{cosec}^{-1}(-x)$

D. $\sec^{-1}(-x)$

Answer: d

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20. $\frac{1+\tan^2\theta}{1+\cot^2\theta} =$

A. To prove (A),(R) is the correct clue .

B. (R) is not sufficent to prove (A)

C. (A) is not true

D. (A) is true but (R) is not true

Answer: a

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Problems For Practice Answer The Following Questions

1. Find the principal value of

$$\sin^{-1}\frac{1}{\sqrt{2}}$$

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2. Find the principal value of

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

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3. Find the principal value of

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

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4. Find the principal values of $\cos^{-1}\frac{1}{2}$

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5. Find the principal value of

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

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6. Find the principal value of

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

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

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8. Find the principal value of

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

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9. Find the principal value of

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

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10. Find the domain $\sin^{-1}(3-4x^2)$

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11. Find the value of

$$\sin^{-1}\left(\sin.\frac{5\pi}{8}\cos.\frac{\pi}{8}-\cos.\frac{5\pi}{8}\sin.\frac{\pi}{8}\right)$$

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12. Find the value of

$$\cos^{-1}\left(\cos.\frac{5\pi}{9}\cos.\frac{\pi}{9}-\sin.\frac{5\pi}{9}.\sin.\frac{\pi}{9}\right)$$

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13. Find the domain of

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

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14. Find the value of

$$2\cos^{-1}.\frac{\sqrt{3}}{2}+\sin^{-1}.\frac{\sqrt{3}}{2}$$

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15. Evaluate :

$$\cos^{-1}\cos\left(\frac{6\pi}{5}\right)+\cos^{-1}\cos\left(\frac{4\pi}{3}\right)$$

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16. Simplify :

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

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17. Prove that $\tan\left(\sin^{-1} x\right) = \frac{x}{\sqrt{1-x^2}} \; -1 < x < 1.$

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

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19. Find the derivatives of the following :

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

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20. Prove the following :

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

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21. Prove that $\frac{\pi}{2} \leq \sin^{-1} x + 2\cos^{-1} x < \frac{3\pi}{2}$

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22. Show that

$$\sin^{-1}\left(\frac{5}{13}\right)+\cot^{-1}\left(\frac{12}{5}\right)=\sin^{-1}\left(\frac{120}{169}\right)$$

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23. Find the value of

$$\tan\left[\frac{1}{2}\text{cosec}^{-1}\left(\frac{1+x^2}{2x}\right)+\frac{1}{2}\sec^{-1}\left(\frac{1+x^2}{1-x^2}\right)\right]$$

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24. $y=\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right), f\in d\frac{dy}{dx}.$

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