MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

INVERSE TRIGONOMETRIC FUNCTIONS

Exercise 4 1

1. Find all the values of x such that

$-10\pi \leq x \leq 10\pi$ and $\sin x = 0$

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2. Find all the values of x such that

$-8\pi \leq x \leq 8\pi$ 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

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

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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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Exercise 4 2

1. Find all the values of x such that

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

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2. Find all the 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

$$\cos^{-1}\left(\cos\frac{\pi}{7}\cos\frac{\pi}{17}-\sin\frac{\pi}{7}\sin\frac{\pi}{17}\right)$$

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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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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

$$\tan\left(\tan^{-1}(-0.2021)\right)$$

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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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Exercise 4 4

1. Find the principal value of

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

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2. Find the principal value of

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

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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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Exercise 4 5

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

$$\sin^{-1}(\cos \pi)$$

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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

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

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8. Find the value of

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

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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

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

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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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Exercise 4 6 Choose The Correct Or The Most Suitable Answer From The Given Four Alternatives

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. $x - \pi$

Answer: B

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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: C

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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:

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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::B

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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. $-\frac{\pi}{4} \leq x \leq \frac{3\pi}{4}$

Answer:

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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:

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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: A

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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::B

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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: A

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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: A::B

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

Answer: B::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: C::D

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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: A::B

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

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

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

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

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

Answer: B

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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: A

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16. If $|x| \leq 1$, then $2\tan^{-1}x - \sin^{-1}\dfrac{2x}{1+x^2}$ is equal to

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

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

C. 0

D. π

Answer:

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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:

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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: A

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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: C

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

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

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

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

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

Answer: A::B

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Additional Questions I Choose The Correct Or The Most Suitable Answer From The Given Four Alternatives

1. If

$$\tan^{-1}\left(\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right) = \alpha \quad \text{then prove that} \quad x^2 = \sin 2\alpha.$$

A. $\sin 2\alpha$

B. $\sin\alpha$

C. $\sin\alpha$

D. $\cos\alpha$

Answer: A::B

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

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

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

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

D. none of these

Answer: B::C

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3. The number of solution of the eqution $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$ is

A. 2

B. 3

C. 1

D. none

Answer: C

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

A. $4\alpha = 3\beta$

B. $3\alpha = 4\beta$

C. $\alpha - 4\beta = \frac{7\pi}{12}$

D. none

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

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5. The number of real solution of the equation $\sqrt{1+\cos 2x} = \sqrt{2}\sin^{-1}(\sin x), \ -\pi < x < \pi$is

A. 0

B. 1

C. 2

D. infinite

Answer: C

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

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

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

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

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

Answer:

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7. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{11}\right) =$

A. 0

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

C. -1

D. none

Answer:

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8. If $\tan^{-1}(3) + \tan^{-1}(x) = \tan^{-1}(8), \quad \text{then} \quad x =$

A. 5

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

C. $\frac{5}{14}$

D. $\frac{14}{5}$

Answer: A::B

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

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

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

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

D. 0

Answer:

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

A. $\frac{6}{25}$

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

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

D. $\frac{-24}{25}$

Answer: B::D

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

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

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

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

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

Answer: B::C

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12. If $\tan^{-1}\left(\frac{x+1}{x-1}\right)+\tan^{-1}\left(\frac{x-1}{x}\right)=\tan^{-1}(-7),$ then x is

A. 0

B. -2

C. 1

D. 2

Answer: B

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

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

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

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

D. $x > 0$

Answer: A::B

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14. In a $\Delta ABC,$ 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. $\frac{\pi}{6}$

Answer: D

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15. $\cot\left(\frac{\pi}{4} - 2\cot^{-1} 3\right)$

A. 7

B. 6

C. 5

D. none

Answer:

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Additional Questions Ii Fill In The Blanks

1. If $\tan^{-1}(\cot\theta) = 2\theta$, then$\theta = \ldots\ldots\ldots\ldots$

A. ± 3

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

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

D. none

Answer:

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

A. [3,5]

B. [-1,1]

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

D. [0,1]

Answer: C

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3. The value of $\tan\left(\cos^{-1}\frac{3}{5}+\tan^{-1}\frac{1}{4}\right)$ is .....

A. $\frac{19}{8}$

B. $\frac{8}{19}$

C. $\frac{19}{12}$

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

Answer: A

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4. The value of $\sin\left(2\left(\tan^{-1}0.75\right)\right.$ is .....

A. 0.75

B. 1.5

C. 0.96

D. $\sin^{-1}(1.5)$

Answer:

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5. If $x > 1$, then$2\tan^{-1} x + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is.....

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

B. 0

C. 2

D. π

Answer:

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6. If $\theta = \sin^{-1}(\sin(-60^\circ))$ then of the possible values of θ is.....

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

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

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

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

Answer: C

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7. The value of $\sin^{-1}\left(\cos\frac{33\pi}{5}\right)$ is.....

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

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

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

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

Answer: A

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8. If

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

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

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

C. $-\pi$

D. none

Answer: B

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

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

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

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

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

Answer:

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10. $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$ .....

A. $\frac{9\pi}{8}$

B. $\frac{-9\pi}{8}$

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

D. $\frac{-\pi}{8}$

Answer:

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Additional Questions Iii Choose The Incorrect Answer

1. For the inverse sine function

A. $\sin^{-1} x$ is an odd function

B. $\sin^{-1} x$ is an even function

C. $\sin^{-1}(\sin x) = \pi - x \quad \text{if} \quad \frac{\pi}{2} \leq x \leq 3\frac{\pi}{2}$

D. It passes through the origin

Answer: A::C

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2. For the inverse cosine function function

A. $y = \cos^{-1} x, \ -1 \leq x \leq 1$

B. $\cos^{-1}(\cos x) = x \ \text{ if } \ 0 \leq x \leq \pi$

C. $\cos^{-1}(\cos 3\pi) = 3\pi$

D. $\cos^{-1}(\cos 3\pi) = \pi$

Answer: A::C

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3. For the inverse tangent function

A. It passes through the origin

B. $y = \tan^{-1} x$ is an odd function

C. It is symmetric w.r.t. origin

D. The inverse tangent function is incresing

Answer: A::C

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4. For the inverse tangent function

A. $\tan\left(\tan^{-1}(2019)\right) = 2019$

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

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

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

Answer: A::C

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5. For the inverse tangent function

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

B. $y = \frac{\pi}{3} \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

C. $\tan^{-1}\sqrt{3} = \frac{\pi}{3}$

D. $y = \frac{\pi}{2} \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

Answer: D

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Additional Questions Iv Choose The Odd Man Out

1. Choose the odd man out

A. Domain is $(-\infty, -1] \cup [1, \infty)$

B. Range is $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right) - \{0\}$

C. Odd function

D. Periodic function

Answer: C::D

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2. Choose the odd man out

A. $\tan\left(\tan^{-1} x\right) = x \text{if } \ x \in R$

B. $\sin^{-1}\left(\frac{1}{x}\right) = \cos ecx \ \text{ if } \ x \in R/(-1, 1)$

C. $\cos^{-1}\left(\frac{1}{x}\right) = \sec x \ \text{ if } \ x \in R/(-1, 1)$

D. $\tan^{-1}\left(\frac{1}{x}\right) = \begin{cases} \cot^{-1} x, & \text{if } \ x > 0 \\ -\pi + \cot^{-1} x & \text{if } \ x < 0 \end{cases}$

Answer: A

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3. Choose the odd man out

A. The x- intercept is 1 and the y-intercept is $\frac{\pi}{2}$

B. It is an even function

C. Not symmetric with respect to orign

D. Not symmetric with restect to y-axis

Answer: A::C

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4. Choose the odd man out

A. $\sin^{-1} x = \cos^{-1} \sqrt{1 - x^2}$ if $0 \leq x \leq 1.$

B. $\sin^{-1} x = \cos^{-1} \sqrt{1 - x^2}$ if $-1 \leq x \leq 0.$

C. $\cos^{-1} x = \sin^{-1} \sqrt{1 + x^2}$ if $0 \leq x \leq 1.$

D. $\cos^{-1} x = \sin^{-1} \sqrt{1 - x^2}$ if $0 \leq x \leq 1.$

Answer: A::B::C

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5. Choose the odd man out

A. $\cot\left(\cot^{-1}(+600)\right) = -600$

B. $\cot\left(\cot^{-1}(1782)\right) = 1782$

C. $\cot\left(\cot^{-1}\left(\frac{-17}{9}\right)\right) = \frac{-17}{9}$

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

Answer: A::C

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Additional Questions 2 Marks

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

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

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

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4. If $\cot^{-1}\left(\frac{1}{7}\right) = \theta,$ find the value of $\cos\theta.$

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

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

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

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

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

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

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Additional Questions 3 Marks

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

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2. Evaluate : $\cos\left[\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{5}{13}\right]$

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3. Prove that $\tan^{-1}\left(\frac{m}{n}\right)-\tan^{-1}\left(\frac{m-n}{m+n}\right)=\frac{\pi}{4}.$

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

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

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

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9. Find the real solutions of the eqution $\tan^{-1}\sqrt{x(x+1)}+\sin^{-1}\sqrt{x^2+x+1}=\frac{\pi}{2}$

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

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Additional Questions 5 Marks

1. Find the domain of the following functions

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

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2. Find the domain of the following functions

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

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3. Write the function $f(x) = \tan^{-1}\sqrt{\frac{a-x}{a+x}} - a < x < a$ in the simplest form.

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

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5. If

$$\tan^{-1}\left(\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right) = \alpha \text{ then prove that } x^2 = \sin 2\alpha.$$

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6. Prove that

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

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