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EXERCISE 2.1 - Question No. 1

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

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EXERCISE 2.1 - Question No. 2

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

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EXERCISE 2.1 - Question No. 3

Find the principal value of: $\cos^{-1}(2)$

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EXERCISE 2.1 - Question No. 4

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

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EXERCISE 2.1 - Question No. 5

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

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EXERCISE 2.1 - Question No. 6

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

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EXERCISE 2.1 - Question No. 7

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

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EXERCISE 2.1 - Question No. 8

Find the principal value of: $\cot^{-1}(\sqrt{3})$

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EXERCISE 2.1 - Question No. 9

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

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EXERCISE 2.1 - Question No. 10

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

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EXERCISE 2.1 - Question No. 11

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

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EXERCISE 2.1 - Question No. 12

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

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EXERCISE 2.1 - Question No. 13

If $s \in^{-1} x = y$, then (A) $0 \leq y \leq \pi$ (B) $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$ (C) $0 < y < \pi$

(d) $-\frac{\pi}{2} < y < \frac{\pi}{2}$

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EXERCISE 2.1 - Question No. 14

$\tan^{-1} \sqrt{3} - \sec^{-1}(-2)$ is equal to (a) π (B) $-\frac{\pi}{3}$ (C) $\frac{\pi}{3}$ (D) $\frac{2\pi}{3}$

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EXERCISE 2.2 - Question No. 1

Prove that: $3 \sin^{-1} x = \sin^{-1}(3x - 4x^3)$, $x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$

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EXERCISE 2.2 - Question No. 2

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

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EXERCISE 2.2 - Question No. 3

Prove that: $\frac{\tan^{-1} 2}{11} + \frac{\tan^{-1} 7}{24} = \frac{\tan^{-1} 1}{2}$

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EXERCISE 2.2 - Question No. 4

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

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EXERCISE 2.2 - Question No. 5

Write the following function in the simplest form:

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

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EXERCISE 2.2 - Question No. 6

Write the following function in the simplest form:

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

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EXERCISE 2.2 - Question No. 7

Write the following function in the simplest form: $\tan^{-1} \sqrt{\frac{1 - \cos x}{1 + \cos x}}$

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EXERCISE 2.2 - Question No. 8

Write the following function in the simplest form:

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

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EXERCISE 2.2 - Question No. 9

Write the following function in the simplest form: $\frac{\tan^{-1} x}{\sqrt{a^2 - x^2}}, |x| < a$

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EXERCISE 2.2 - Question No. 10

Write the following function in the simplest form:

$$\tan^{-1} \left(\frac{3a^2x - x^3}{a^3 - 3ax^2} \right), a > 0; \frac{-a}{\sqrt{3}} \leq x \leq \frac{a}{\sqrt{3}}$$

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EXERCISE 2.2 - Question No. 11

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

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EXERCISE 2.2 - Question No. 12

Find the value of: $\cot(\tan^{-1} a + \cot^{-1} a)$

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EXERCISE 2.2 - Question No. 13

Find the value of:

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

and $xy < 1$

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EXERCISE 2.2 - Question No. 14

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

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EXERCISE 2.2 - Question No. 15

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

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EXERCISE 2.2 - Question No. 16

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

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EXERCISE 2.2 - Question No. 17

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

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EXERCISE 2.2 - Question No. 18

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

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EXERCISE 2.2 - Question No. 19

$\cos^{-1}\left(\frac{\cos(7\pi)}{6}\right)$ is equal to (a) $\frac{7\pi}{6}$ (B) $\frac{5\pi}{6}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

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EXERCISE 2.2 - Question No. 20

$\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to (A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1

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EXERCISE 2.2 - Question No. 21

$\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is equal to (A) π (B) $-\frac{\pi}{2}$ (C) 0 (D) $2\sqrt{3}$

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MISCELLANEOUS EXERCISE - Question No. 1

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

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MISCELLANEOUS EXERCISE - Question No. 2

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

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MISCELLANEOUS EXERCISE - Question No. 3

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

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MISCELLANEOUS EXERCISE - Question No. 4

Prove that:
$$\frac{\sin^{-1} 8}{17} + \frac{\sin^{-1} 3}{5} = \frac{\tan^{-1}(77)}{36}$$

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MISCELLANEOUS EXERCISE - Question No. 5

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

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MISCELLANEOUS EXERCISE - Question No. 6

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

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MISCELLANEOUS EXERCISE - Question No. 7

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

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MISCELLANEOUS EXERCISE - Question No. 8

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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MISCELLANEOUS EXERCISE - Question No. 9

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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MISCELLANEOUS EXERCISE - Question No. 10

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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MISCELLANEOUS EXERCISE - Question No. 11

Prove that

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

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MISCELLANEOUS EXERCISE - Question No. 12

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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MISCELLANEOUS EXERCISE - Question No. 13

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

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MISCELLANEOUS EXERCISE - Question No. 14

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

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MISCELLANEOUS EXERCISE - Question No. 15

Solve the equations. $\sin(\tan^{-1} x), |x| < 1$ (a) $\frac{x}{\sqrt{1-x^2}}$ (B) $\frac{1}{\sqrt{1-x^2}}$
(C) $\frac{1}{\sqrt{1+x^2}}$ (D) $\frac{x}{\sqrt{1+x^2}}$

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MISCELLANEOUS EXERCISE - Question No. 16

$\sin^{-1}(1 - x) - 2 \sin^{-1} x = \frac{\pi}{2}$, 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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MISCELLANEOUS EXERCISE - Question No. 17

$\tan^{-1}\left(\frac{x}{y}\right) - \frac{\tan^{-1}(x - y)}{x + y}$ is equal to (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $-\frac{3\pi}{4}$

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SOLVED EXAMPLES - Question No. 1

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

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SOLVED EXAMPLES - Question No. 2

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

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SOLVED EXAMPLES - Question No. 3

Show that (i) $\sin^{-1} \left(2x\sqrt{1-x^2} \right) = 2\sin^{-1} x, -\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$ (ii)
 $\sin^{-1} \left(2x\sqrt{1-x^2} \right) = 2\cos^{-1} x, \frac{1}{\sqrt{2}} \leq x \leq 1$

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SOLVED EXAMPLES - Question No. 4

Show that $\frac{\tan^{-1} 1}{2} + \frac{\tan^{-1} 2}{11} = \frac{\tan^{-1} 3}{4}$

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SOLVED EXAMPLES - Question No. 5

Express $\tan^{-1}\left(\frac{\cos x}{1 - \sin x}\right)$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$ in the simplest form.

le b= gt lt /x lt pi gt

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SOLVED EXAMPLES - Question No. 6

Write $\cot^{-1}\left(\frac{1}{\sqrt{x^2 - 1}}\right)$, $|x| > 1$ in the simplest form.

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SOLVED EXAMPLES - Question No. 7

Prove that

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

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SOLVED EXAMPLES - Question No. 8

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

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SOLVED EXAMPLES - Question No. 9

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

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SOLVED EXAMPLES - Question No. 10

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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SOLVED EXAMPLES - Question No. 11

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

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SOLVED EXAMPLES - Question No. 12

Simplify $\tan^{-1} \left[\frac{a \cos x - b \sin x}{b \cos x + a \sin x} \right]$, if $\frac{a}{b} \tan x$ and $> ; - 1$.

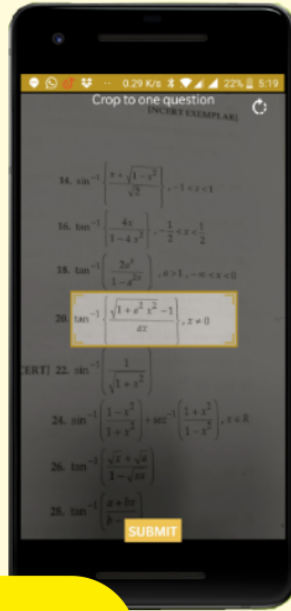
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SOLVED EXAMPLES - Question No. 13

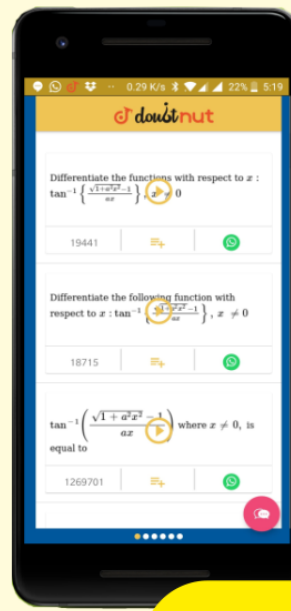
Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$.

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