VIDYA BHAWAN BALIKA VIDYA PITH

शक्तिउत्थानआश्रमलखीसरायबिहार

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Evaluate: $\sin^{-1}(\sin 10)$

Solution:

We know that $\sin^{-1}(\sin \theta) = \theta$, if $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$.
Here, θ = 10 radians which does not lie between $-\frac{\pi}{2}$ and $\frac{\pi}{2}$. But 3π - θ i.e., 3π - 10 lies between $-\frac{\pi}{2}$ and $\frac{\pi}{2}$ and sin (3π - 10) = sin 10.
Now, $\sin^{-1}(\sin 10)$

= sin^-1 (sin (3π - 10)

= 3π - 10

Therefore, $\sin^{-1}(\sin 10) = 3\pi - 10$.

4. Find the values of $\cos(\tan^{-1} \frac{3}{4})$

Solution:

Let, $\tan^{-1} \frac{3}{4} = \theta$

Therefore, $\tan \theta = \frac{3}{4}$

We know that $\sec^2 \theta - \tan^2 \theta = 1$
$\Rightarrow \sec \theta = \sqrt{(1 + \tan^2 \theta)}$
$\Rightarrow \sec \theta = \sqrt{(1 + (3/4)^2)}$

$\Rightarrow \sec \theta = \sqrt{(1 + 9/16)}$

$\Rightarrow \sec \theta = \sqrt{(25/16)}$

$\Rightarrow \sec \theta = 5/4$

Therefore, $\cos \theta = 4/5$

$\Rightarrow \theta = \cos^{-1} 4/5$
Now, $\cos(\tan^{-1} \frac{3}{4}) = \cos(\cos^{-1} 4/5) = 4/5$
Therefore, $\cos(\tan^{-1} \frac{3}{4}) = 4/5$

5. Find the values of sec $\csc^{-1}-1\ (2/\sqrt{3})$

Solution:

sec $\csc^{-1}-1\ (2/\sqrt{3})$
= sec $\csc^{-1}-1\ (\csc \pi/3)$
= sec $(\csc^{-1}-1\csc \pi/3)$

= sec $\pi/3$

= 2

Therefore, sec $\csc^{-1}-1\ (2/\sqrt{3}) = 2$