

King Fahd University of Petroleum and Minerals
Faculty of Science, Prep -Year Math Program
Math 002 - Term 072 - 6.3, 6.4

Question1

Find the exact value of $\cos \frac{\alpha}{2}$ if $\csc \alpha = \frac{-5}{3}$, $\pi < \alpha < \frac{3\pi}{2}$ **ANS:=** $\frac{-1}{\sqrt{10}}$

Question2

$\tan \alpha = \frac{-4}{3}$, $\frac{3\pi}{2} < \alpha < 2\pi$. Find $\sec \frac{\alpha}{2}$. **ANS:=** $\frac{-\sqrt{5}}{2}$

Question3

$\tan 165^\circ =$ (**Hint:** $165^\circ = \frac{330^\circ}{2}$)

Question4

Verify that $\frac{\sin 2x - \sin x}{2\cos^2 x + \cos x - 1} = \tan \frac{x}{2}$.

Question 5

Evaluate $\sin \frac{13\pi}{12} \cos \frac{\pi}{12}$ **ANS:=** $\frac{-1}{4}$

Question 6

Evaluate $2\sin^2 5^\circ + 2\sin^2 85^\circ + 5\sin 217^\circ + 5\cos 307^\circ$ **ANS:=** 2

Question7

If $\sin \alpha = \frac{1}{2}$, where $\frac{\pi}{2} < \alpha < \pi$, then find $\sin 2\alpha$. **ANS:=** $-\frac{\sqrt{3}}{2}$

Question8

Find the exact value of

a) $\left(\sin \frac{\pi}{12} + \cos \frac{\pi}{12} \right)^2$ **ANS:=** $\frac{1}{2}$

b) $\sin \frac{\pi}{12} \cos \frac{\pi}{12}$ **ANS:=** $\frac{1}{4}$

Question9

Verify the following identities

a) $\frac{\cos^2 x - \cos 2x}{1 + \cos x} = 2 \sin^2 \frac{x}{2}$

b) $\frac{1 - \tan^2 \beta}{1 + \tan^2 \beta} = \cos 2\beta$

Question10

If $\sin 40^\circ + \cos 40^\circ = k \sin(\beta)$. Find the values of k and β **ANS:=** $k = \sqrt{2}$, $\beta = 85^\circ$