

Quiz 6 on PreCalculus II (Math 1151)

Mark your Recitation Session Number: 015 023 025

Name: _____ Student ID: _____ Score: _____

You must show all your work. Correct answer without any step earns zero point.
You **cannot** use calculators in this quiz.

Solve each of the following equations on the interval $0 \leq \theta < 2\pi$:

1. (3 points.)

$$\tan \frac{\theta}{2} = -1$$

Solution: write $x = \frac{\theta}{2}$, we are now solving $\tan x = -1$, on $0 \leq x < \pi$.

We know that $x = -\frac{\pi}{4}$ is a solution, thus in general the solutions are $x = -\frac{\pi}{4} + k\pi$, where k is any integer. The only solution in the above interval is $x = \frac{3\pi}{4}$.

Now we substitute back to θ : $\theta = 2x = \frac{3\pi}{2}$ is the solution.

2. (3 points.)

$$\cos(3\theta + \pi) = 1$$

Solution: write $x = 3\theta + \pi$, we are now solving $\cos x = 1$, on $\pi \leq x < 7\pi$.

We know that $x = 0$ is a solution, and generally the solutions are $x = 2k\pi$, where k is any integer. So solutions in the above interval are $x = 2\pi, 4\pi$, or 6π .

Now we substitute back to θ : $\theta = \frac{x - \pi}{3} = \frac{\pi}{3}, \pi$, or $\frac{5\pi}{3}$.

3. (4 points.)

$$3(1 + \sin \theta) \sec^2 \theta = 1$$

Solution: the L.H.S. of the equation is equals to:

$$\frac{3(1 + \sin \theta)}{\cos^2 \theta} = \frac{3(1 + \sin \theta)}{1 - \sin^2 \theta} = \frac{3(1 + \sin \theta)}{(1 - \sin \theta)(1 + \sin \theta)} = \frac{3}{1 - \sin \theta}$$

Thus, by moving the denominator to the R.H.S. we are solving: $3 = 1 - \sin \theta$, i.e. $\sin \theta = -2$.
So there's no solution for the equation.