

NAME: Solution

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MAC 1147 Section 3079  
Quiz Ten

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Please show all of your work in a NEAT and ORGANIZED fashion.

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1. (3 points) Factor the following trigonometric expression:

$$\begin{aligned}\cot^2(x) + \csc(x) - 1 &= \\ \csc^2 x - 1 + \csc x - 1 &= \\ \csc^2 x + \csc x - 2 &= \\ (\csc x + 2)(\csc x - 1) &= \end{aligned}$$

$$\begin{aligned}1 + \cot^2 x &= \csc^2 x \\ \cot^2 x &= \csc^2 x - 1\end{aligned}$$

2. (3 points) Verify the following identity:

$$\begin{aligned}\cos x + \sin x \tan x &= \sec x \\ \cos x + \sin x \left(\frac{\sin x}{\cos x}\right) &= \\ \cos x + \frac{\sin^2 x}{\cos x} &= \\ \frac{\cos^2 x + \sin^2 x}{\cos x} &= \\ \frac{1}{\cos x} &= \\ \sec x &\checkmark\end{aligned}$$

3. (3 points) Find all solutions of the equation in the interval  $[0, 2\pi)$ :

$$\begin{aligned}2 \cos^2 x - 3 \sin x - 3 &= 0 \\ 2(1 - \sin^2 x) - 3 \sin x - 3 &= 0 \\ 2 - 2 \sin^2 x - 3 \sin x - 3 &= 0 \\ -2 \sin^2 x - 3 \sin x - 1 &= 0 \\ 2 \sin^2 x + 3 \sin x + 1 &= 0 \\ (2 \sin x + 1)(\sin x + 1) &= 0 \\ \sin x = -\frac{1}{2} \text{ or } \sin x = -1 & \\ x = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2} &\end{aligned}$$

$$\begin{aligned}\sin^2 x + \cos^2 x &= 1 \\ \cos^2 x &= 1 - \sin^2 x\end{aligned}$$