Name: _____ Date: _____

Learning Goal 4.2	Solving first- and second-degree equations over restricted domains and all real numbers.

More Questions - Solutions

1. Solve the following trigonometric equation on the specified domain for exact value(s) of θ, where possible without using a calculator. Otherwise round your answers to the nearest hundredth.

   a. $\cos^2\theta - 1 = 0,\ \ 0° \le \theta < 360°$

$$\cos^2\theta - 1 = 0$$
$$\cos^2\theta = 1$$
$$\cos\theta = \pm 1$$

$\cos\theta_1 = 1$

$\cos\theta = \frac{x}{r}$
$x = r$
$y = 0$

$\theta_1 = 0°$

$\cos\theta_2 = -1$

$\cos\theta = \frac{x}{r}$
$-x = r$
$y = 0$

$\theta_2 = 180°$

   b. $\sin^2\theta + \sin\theta - 2 = 0, 0 \le \theta < 2\pi$

$$\sin^2\theta + \sin\theta - 2 = 0$$
$$(\sin\theta + 2)(\sin\theta - 1) = 0$$

$\sin\theta_1 + 2 = 0$
$\sin\theta_1 = -2$

θ_1 DNE

$\sin\theta_2 - 1 = 0$
$\sin\theta_2 = 1$

$\sin\theta = \frac{y}{r}$
$y = r$
$x = 0$

$\theta_2 = \frac{\pi}{2}$

c. $\sec^2 x - 4 = 0, 0 \le x < 2\pi$

$$\sec^2 x - 4 = 0$$
$$\sec^2 x = 4$$
$$\sec x = \pm 2$$
$$\cos x = \pm\frac{1}{2}$$

$\cos x = \frac{1}{2}$

$\cos x = \frac{x}{r}$
$x = 1$
$r = 2$
$x_R = \frac{\pi}{3}$

$x_1 = x_R = \frac{\pi}{3}$

$x_2 = 2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$

$\cos x = -\frac{1}{2}$

$\cos x = \frac{x}{r}$
$x = -1$
$r = 2$
$x_R = \frac{\pi}{3}$

$x_3 = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$

$x_4 = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$

d. $3\tan^2 x - \tan x = 4, -\pi \le x < 2\pi$

$$3\tan^2 x - \tan x = 4$$
$$3\tan^2 x - \tan x - 4 = 0$$
$$3\tan^2 x - 4\tan x + 3\tan x - 4 = 0$$
$$\tan x\,(3\tan x - 4) + (3\tan x - 4) = 0$$
$$(\tan x + 1)(3\tan x - 4) = 0$$

$\tan x + 1 = 0$
$\tan x = -1$

$\tan x = \frac{y}{x}$
$x = \pm 1$
$y = \pm 1$
$x_R = \frac{\pi}{4}$

$x_1 = -\frac{\pi}{4}$

$x_2 = \pi - \frac{\pi}{4} = \frac{3\pi}{4}$

$x_3 = 2\pi - \frac{\pi}{4} = \frac{7\pi}{4}$

$3\tan x - 4 = 0$
$3\tan x = 4$
$\tan x = \frac{4}{3}$

$\tan x = \frac{y}{x}$
$y = 4$
$x = 3$
$r = 5$

$x_4 = \tan^{-1}\left(\frac{4}{3}\right) = 0.927$

$x_5 = \pi + x_4 = 4.069$

$x_6 = -\pi + x_4 = -2.214$