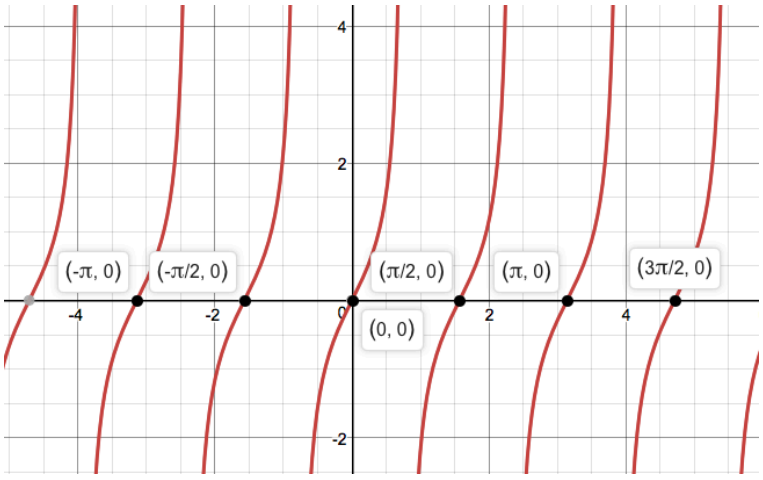
AAT Name _____

5-7 General Solutions to Trig Equations Date _____ **A#14**

Goal: Consider and write solutions to equations over the entire set of real numbers.

Warm Up: The function $y = \tan(2x)$ is graphed below. Graph $y = 3$. Based on the graph, what are the values of x in radians that make $3 = \tan(2x)$ true?



The Simplest Trigonometric Equations

Example 1: Consider the equation $\cos\theta = 0.6$. Round all solutions to the nearest thousandths.

a. Use inverse to find solution between 0 and π

b. Subtract from 2π to find solutions when $0 \le \theta \le 2\pi$

c. Add cyclical term to cover all solutions

Questions

Questions

Example 2: Consider the equation $\sin\theta = \frac{3}{7}$. Round all solutions to the nearest thousandth.

Example 3: The output voltage E (in volts) of a circuit after t seconds ($t > 0$) is given by $E = 12\sin(2\pi t)$. To the nearest 0.01 second, at which times in the first three seconds does $E = 9$?

Example 4:

A merry-go-round with a 16-foot radius is designed to make a revolution every 40 seconds. Set up a coordinate system looking at the merry-go-round from above so that a point on the edge of the merry-go-round that is due east of its center at time $t = 0$ has coordinate (16, 0). The position of this point after t seconds is $\left(16\cos\left(\frac{\pi t}{20}\right), 16\sin\left(\frac{\pi t}{20}\right)\right)$. At what times in the first revolution is the point 10 feet east of the center of the merry-go-round?

Questions

Trigonometric Equations with Quadratic Form

Example 5: Consider $2\sin^2\theta = 1 - \sin\theta$. Find all the solutions in the interval $0 \le \theta \le 2\pi$. Find the general solution.

Example 6:

Consider the equation $6\cos^2\theta + \cos\theta = 2$.
a. Find all solutions in the interval $0 \le \theta \le 360°$.
b. Find the general solution.

Questions

Practice

In 1–3, (a) solve, given that $0° \le \theta \le 360°$. Give solutions to the nearest hundredth of a degree.

1. $\sin\theta - 0.23 = 0$ _____

2. $4\cos\theta = \frac{3}{5}$ _____

3. $5\sin\theta + 3 = -0.8$ _____

In 4 and 5, find the least positive solution in radians, to the nearest hundredth.

4. $\frac{1}{\cos\theta} = \frac{8}{7}$ _____

5 $\tan^2\theta = -2\tan\theta + 15$ _____

In 6-8, describe the general solution in radians.

6. $0.3\sin\left(\frac{1}{2}\theta\right) + 0.2 = 0.4$

7. $\cos(5\theta) = 0.75$

Summary: