Name: _____   Date: _____

5.4 Solve Trigonometric Equations

1. Determine approximate solutions for each equation in the interval $x \in [0, 2\pi]$, to the nearest hundredth of a radian.
   a) $\cos x + 0.6 = 0$
   b) $\sin x - 2.5 = 0$
   c) $\csc x + 3 = 0$
   d) $\cot x - 2.75 = 0$
   e) $2 \sec x - 5 = 0$

2. **Use Technology** Verify the answers to question 1 by graphing with technology.

3. Determine exact solutions for each equation in the interval $x \in [0, 2\pi]$.
   a) $\tan x + 1 = 0$
   b) $\sin x - 0.5 = 0$
   c) $\cot x + \sqrt{3} = 0$
   d) $\sec x - \sqrt{2} = 0$
   e) $2 \cos x + \sqrt{3} = 0$

4. Illustrate the answers to question 3 by graphing.

5. Determine approximate solutions for each equation in the interval $x \in [0, 2\pi]$, to the nearest hundredth of a radian.
   a) $\sin^2 x - 0.25 = 0$
   b) $\tan^2 x - 1.21 = 0$
   c) $\cos^2 x - 0.49 = 0$
   d) $\csc^2 x - \dfrac{25}{9} = 0$
   e) $\sec^2 x - 1.69 = 0$

6. **Use Technology** Verify the answers for each equation in question 5 by graphing with technology.

7. Solve $2 \sin^2 x - \sin x - 1 = 0$ on the interval $x \in [0, 2\pi]$, giving exact answers.

8. Solve $\tan^2 x + 3 \tan x - 28 = 0$ on the interval $x \in [0, 2\pi]$, to the nearest hundredth of a radian.

9. Solve $\sec^2 x - 5 \sec x + 6 = 0$ on the interval $x \in [0, 2\pi]$, to the nearest hundredth of a radian.

10. Determine exact solutions for each equation in the interval $2x \in [0, \pi]$.
    a) $\sin 2x - 0.5 = 0$
    b) $2 \cos 2x + \sqrt{3} = 0$

For the remaining questions determine exact solutions where possible. If exact solutions are not possible determine approximate solutions, rounded to the nearest hundredth of a radian.

11. Solve $2 \cos^2 x - 4 \cos x = 0$ on the interval $x \in [0, 2\pi]$.

12. Solve $\sin 2x = \cos 2x$ on the interval $x \in [0, 2\pi]$.

13. Solve $6 \csc^2 x - 5 \csc x - 6 = 0$ on the interval $x \in [0, 2\pi]$.

14. Solve $6 \sin^2 x - \sin x - 1 = 0$ on the interval $x \in [0, 2\pi]$.

15. Solve $4 \tan^2 x + 2 \tan x - 3 = 0$ on the interval $x \in [0, 2\pi]$.

16. **Use Technology** Use graphing technology to verify your answers to question 15.

17. The range that a baseball can be thrown underhand can be modelled by the equation $r = 45 \sin 2x$, where r is the range, in metres, and x is the angle, in radians, above the horizontal where the ball is released. A target, home plate in a soft ball baseball game, is 18 m away.
    a) What are the restrictions on angle x? Justify your answer.
    b) Determine the angle(s) that the baseball player should use when releasing the ball in order to get the ball over home plate.

18. Determine solutions for $\tan x \sec^2 x = 2 \tan x$ in the interval $x \in \left[-\pi, \dfrac{3\pi}{2} \right]$.