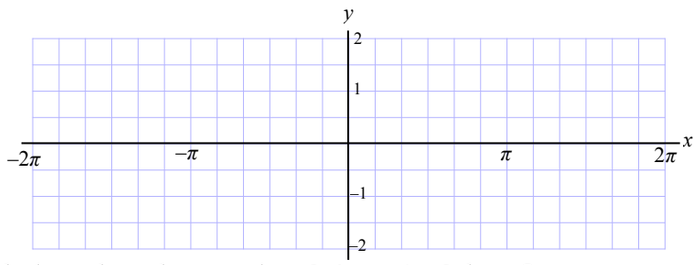
Name: _____ **Precalculus Unit 10, Lesson 7**

Aim: How do we solve trigonometric equations?

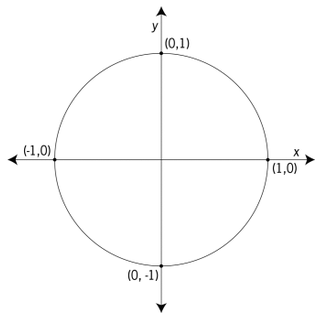
I. Do Now:

(a) Solve for x: $2\sin x - 1 = 0$

(b) Sketch the graphs of $y = \sin x$ and $y = \frac{1}{2}$ on the same set of axes below.



(c) Label all points on the unit circle below where $y = \frac{1}{2}$.



(d) How many solutions does the equation $2\sin x - 1 = 0$ have?

II. Solving trigonometric equations is similar to solving algebraic equations. You may need to isolate the trig function (like isolating the variable), combine like terms, factor and set factors equal to zero, square or square root both sides, use the quadratic formula, etc.

In addition to the above techniques, with trigonometric equations, you will need to ask yourself the following questions:

i. Are the trig functions the same? (e.g., $\cos\theta$ and $\tan\theta$ are different trig functions.)

ii. Are the angles the same? (e.g., $\cos 2x$ and $\cos x$ are both the same trig function, but of different angles, i.e., $2x$ and x)

iii. What is the domain?

When trig functions are different or angles are different, you will usually need to use the identities that you have learned to express the equation in terms of a *single trig function* of the *same angle*.

III. Examples. Solve for all values of x in the interval $[0, 2\pi)$.

1. $\sin x + \sqrt{2} = -\sin x$

2. $\sqrt{3}\csc x - 2 = 0$

3. $3\tan^2 x - 1 = 0$

4. $\cot x \cos^2 x = 2\cot x$

5. $2\sin^2 x - \sin x - 1 = 0$

6. $2\sin^2 x + 3\cos x - 3 = 0$

7. $2\cos x + \sin 2x = 0$

8. $\cos 2x + \sin^2 x = 1$

9. $\cos x + 1 = \sin x$
   [*Hint*: Begin by squaring both sides.]

HW32
- p. 432: 11, 14, 15, 21, 28
  [Find all solutions in the interval [0, 2π).]
- p. 451: 10, 14
- p. 458: 18, 19