3.3 A Trigonometric Equations

- Introduction

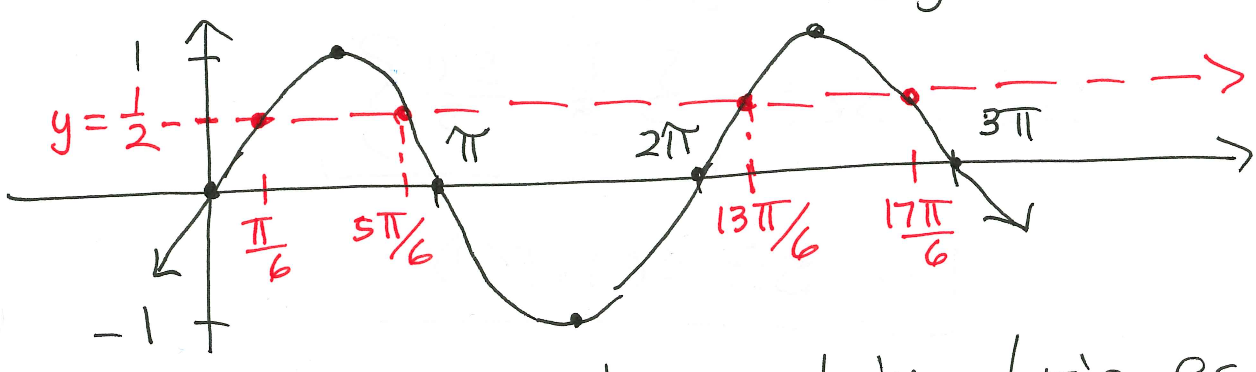
Unless otherwise specified, solutions for equations containing trig. functions should be in exact form as angles in radians in terms of π. Because trig. functions are periodic, there are an infinite number of solutions for many of these equations. For example,

$$\sin x - \frac{1}{2} = 0$$

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

$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}, \ldots$$ or in general, $x = \frac{\pi}{6} + 2\pi n$ OR $x = \frac{5\pi}{6} + 2\pi n$

where n is an integer.



In most cases, when solving trig. equations the domain of the trig. function is restricted.

If the domain is restricted, the equation will have a specific number of solutions. Usually, the restriction is $[0, 2\pi)$.

- <u>Equations With a Single Trig. Function</u>

<u>EX</u>! Solve $2\sin\theta + \sqrt{3} = 0$, θ in $[0, 2\pi)$.

$$2\sin\theta = -\sqrt{3}$$

$$\sin\theta = -\frac{\sqrt{3}}{2}$$

$$\Rightarrow \theta = \frac{4\pi}{3}, \frac{5\pi}{3}$$

$$\text{Sol. Set} = \underbrace{\left\{\frac{4\pi}{3}, \frac{5\pi}{3}\right\}}$$

<u>EX</u>: Solve $1 - \cos\theta = \frac{1}{2}$, θ in $[0, 2\pi)$.

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

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

$$\Rightarrow \theta = \frac{\pi}{3}, \frac{5\pi}{3}$$

$$\text{Sol. Set} = \underbrace{\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}}$$

<u>TO BE CONT'D</u>