SEC 3.6 SOLVING TRIG EQUATIONS
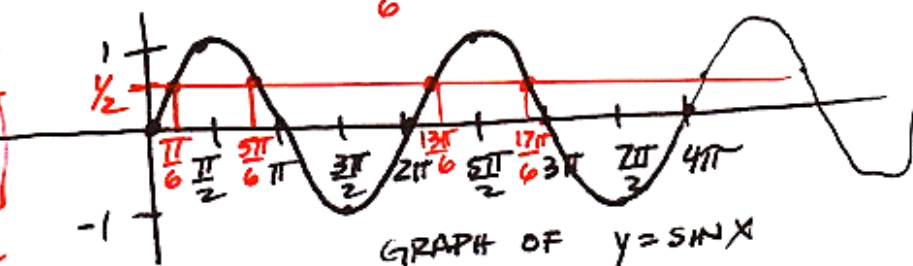
1.

$\sin^{-1} x$ $\sin^{-1}$

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

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

$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$

$0 \leq x < 2\pi$
INTERVAL

$\dfrac{\pi}{6} = \left(\dfrac{\sqrt{3}}{2}, \dfrac{1}{2} \right)$ COS   SIN

$\dfrac{5\pi}{6} = \left(-\dfrac{\sqrt{3}}{2}, \dfrac{1}{2} \right)$

$\frac{5\pi}{6}$ $\frac{\pi}{6}$

$\frac{1}{2}$ $\frac{\pi}{6} \frac{\pi}{2} \frac{5\pi}{6} \pi \frac{3\pi}{2} 2\pi \frac{13\pi}{6} \frac{5\pi}{2} \frac{17\pi}{6} 3\pi \frac{7\pi}{3} 4\pi$

-1

GRAPH OF $y = \sin x$

OR $\dfrac{\pi}{6} + 2\pi k$

$\left\{ \begin{array}{l} \text{IF NO} \\ \text{INTERVAL IS} \\ \text{GIVEN} \end{array} \right\}$ $\dfrac{5\pi}{6} + 2\pi k$

2. $2 \sin^2 x \cos x - \cos x = 0$ $0 \leq x < 2\pi$

$\cos x \left(2 \sin^2 x - 1 \right) = 0$

$\cos^{-1}$ $\cos x = 0$ $\cos^{-1}$

$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$

$2 \sin^2 x - 1 = 0$
$+1 \quad +1$

$2 \sin^2 x = 1$

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

$\sqrt{\sin^2 x} = \sqrt{\frac{1}{2}}$ $\sin^{-1}$

$\sin x = \pm \dfrac{\sqrt{2}}{2}$ $\sin^{-1}$

$\boxed{x = \dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}}$

H.W. #42

$$\cos^2 x + 4 = 2\sin x - 3$$

$$(1 - \sin^2 x) + 4 = 2\sin x - 3 + \sin^2 x$$
$$-1 + \sin^2 x \quad -4 \qquad\qquad \begin{array}{c} -1 \\ -4 \end{array}$$

$$0 = \sin^2 x + 2\sin x - 8$$

$$0 = (\sin x + 4)(\sin x - 2)$$

$$\sin x + 4 = 0 \qquad\qquad \sin x - 2 = 0$$
$$\qquad -4 \ -4 \qquad\qquad\qquad +2 \ +2$$
$$\sin x = -4 \qquad\qquad \sin x = 2$$
$$x = \sin^{-1} -4 \qquad\qquad x = \emptyset$$
$$\emptyset$$

REV #21

$$\left(-\tfrac{1}{2}, \tfrac{\sqrt{3}}{2}\right) \qquad \left(\tfrac{1}{2}, \tfrac{\sqrt{3}}{2}\right)$$
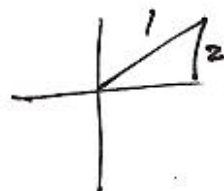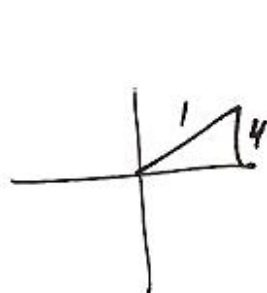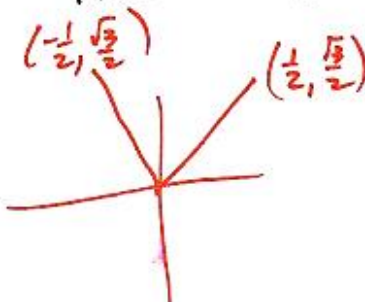
$$\frac{2}{2}\sin x = \frac{\sqrt{3}}{2}$$

$$\sin x = \frac{\sqrt{3}}{2}$$

$$\boxed{x = \frac{\pi}{3}, \ \frac{2\pi}{3}}$$

REV #22 $\cos^2 x - 1 = 0$ $0 \leq x < 2\pi$

$$(\cos x + 1)(\cos x - 1) = 0$$

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

$\cos^{-1}\cos x = \cos^{-1} -1$ $\cos^{-1}\cos x = \cos^{-1} 1$

$\boxed{x = \pi}$ $\boxed{x = 0, \; 2\pi}$

REV 24 $2\sin x - \sin 2x = 0$

$$2\sin x - 2\sin x \cos x = 0$$

$$2\sin x (1 - \cos x) = 0$$

$\dfrac{2\sin x}{2} = \dfrac{0}{2}$ $1 - \cos x = 0$
 $ + \cos x \cos x$

$\sin^{-1}\sin x = \sin^{-1} 0$ $\cos^{-1} 1 = \cos^{-1}\cos x$

$\boxed{x = 0, \pi}$ $\boxed{x = 0}$