Review - Prove

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

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

$\sin^2 x - \sin x\cos x - \sin x\cos x + \cos^2 x - 1 =$

$\sin^2 x + \cos^2 x - 1 - 2\sin x\cos x =$

$1 - 1 - 2\sin x\cos x =$

$-2\sin x\cos x =$

$-\sin 2x = -\sin 2x$ ✓

7.5 Solving Trig Equations

LT45: I can solve trigonometric equations giving solutions as principle values, first rotation values, or all real values.

Example

$$\sin^2 x - \sin x + 1 = \cos^2 x \quad \text{for } 0 \le x < 2\pi$$

$-\cos^2 x \quad -\cos^2 x$

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

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

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

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

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

$+1 \quad +1$

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

$0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$

Principle values – When a variable is restricted to two adjacent quadrants.

* $\sin x$ & $\tan x \rightarrow$ Quad. I & IV $(-90° \le x \le 90°)$
* $\cos x \rightarrow$ Quad. I & III $(0° \le x \le 180°)$

Example

$$2\sin^2 x + \sin x - 1 = 0 \quad \text{for principal values of } x \text{ in degrees}$$

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

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

$+1 \quad +1$ $\quad -1 \quad -1$

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

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

$30°, -90°$

Example #6

$$2\cos x - \sqrt{3} = 0 \quad \text{(Find all principal values in degrees)}$$

$+\sqrt{3} \quad +\sqrt{3}$

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

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

$30°$