

## Trigonometric Equations

### (Solutions to end of 6.2/6.3 Notes)

As mentioned in class, here are the first steps of the solutions to the trig equations at the end of the 6.2/6.3 packet of notes.

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

$$\cos x (2 \cos x - 1) = \left(\frac{1}{\cos x}\right) \cos x$$

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

$$2 \cos^2 x - \cos x - 1 = 0$$

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

$$\begin{array}{l} \downarrow \qquad \qquad \downarrow \\ 2 \cos x + 1 = 0 \qquad \cos x - 1 = 0 \\ \vdots \qquad \qquad \qquad \vdots \\ \text{Check solutions} \end{array}$$

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

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

$$0 = \sin^2 x$$

$$\sin x = 0$$

$$\vdots$$

$$\sin^2 x \cos x = \cos x$$

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

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

$$\begin{array}{l} \swarrow \\ \cos x = 0 \\ \vdots \end{array} \qquad \begin{array}{l} \sin^2 x - 1 = 0 \\ \sin x = \pm 1 \\ \vdots \end{array}$$

$$4 \cos^2 x + 3 \cos x = 1$$

$$4 \cos^2 x + 3 \cos x - 1 = 0$$

$$(4 \cos x - 1)(\cos x + 1) = 0$$

$$\begin{array}{l} \swarrow \\ 4 \cos x - 1 = 0 \\ \vdots \end{array} \qquad \begin{array}{l} \cos x + 1 = 0 \\ \vdots \end{array}$$

$$\sec^2 x = 2 \tan x + 4$$

$$\tan^2 x + 1 = 2 \tan x + 4$$

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

$$\begin{array}{l} \swarrow \\ (\tan x + 1)(\tan x - 3) = 0 \\ \vdots \end{array}$$

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

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

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

$$\vdots$$

$$\sec \frac{x}{2} = \cos \frac{x}{2}$$

$$\cos \frac{x}{2} \left( \frac{1}{\cos \frac{x}{2}} \right) = \left( \cos \frac{x}{2} \right) \cos \frac{x}{2}$$

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

$$\cos \frac{x}{2} = \pm 1$$

$$\vdots$$

Check solutions

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

$$\cos x = \left( \pm \sqrt{\frac{1 - \cos x}{2}} \right)^2$$

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

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

$$3 \cos x = 1$$

$$\cos x = \frac{1}{3}$$

$$\vdots$$