

Trigonometric Equations

$$\sin \theta = 0.5 \quad \cos \theta = -0.75 \quad \text{Simple}$$

- ① RAA ② CAST \rightarrow quadrants ③ solve for θ_1, θ_2
④ coterminal angles?
-

$$\sin(2\theta) = -0.5 \quad \longrightarrow \quad \sin x = -0.5$$

$$\text{let } x = 2\theta$$

Solve for θ , $0^\circ \leq \theta < 360^\circ$

① RAA?

$$\sin \text{RAA} = 0.5$$

$$\text{RAA} = \sin^{-1}(0.5)$$

$$\text{RAA} = 30^\circ$$

② Quadrants?

| | |
|----------------|----------------|
| S ⁺ | A ⁺ |
| T ⁻ | C ⁻ |

$\sin x < 0$
Q3 or Q4

$$\text{Q3: } x_1 = 180^\circ + 30^\circ = 210^\circ$$

$$\text{Q4: } x_2 = 360^\circ - 30^\circ = 330^\circ$$

$$0^\circ \leq \theta < 360^\circ \quad [x2]$$

$$0^\circ \leq 2\theta < 720^\circ$$

$$0^\circ \leq x < 720^\circ$$

need to consider additional coterminal angles for x

$$x_3 = 210^\circ + 360^\circ = 570^\circ$$

$$x_4 = 330^\circ + 360^\circ = 690^\circ$$

recall: $x = 2\theta$

$$\theta = \frac{x}{2}$$

$$\begin{aligned} \text{Q3: } x_1 &= 180^\circ + 30^\circ \\ &= 210^\circ \end{aligned}$$

$$\begin{aligned} \text{Q4: } x_2 &= 360^\circ - 30^\circ \\ &= 330^\circ \end{aligned}$$

$$\theta_1 = \frac{x_1}{2}$$

$$= \frac{210^\circ}{2}$$

$$= \underline{105^\circ}$$

$$\theta_3 = \frac{x_3}{2}$$

$$= \frac{570^\circ}{2}$$

$$= \underline{285^\circ}$$

$$\theta_2 = \frac{x_2}{2}$$

$$= \frac{330^\circ}{2}$$

$$= \underline{165^\circ}$$

$$\theta_4 = \frac{x_4}{2}$$

$$= \frac{690^\circ}{2}$$

$$= \underline{345^\circ}$$

need to consider
additional coterminal
angles for x

$$\begin{aligned} x_3 &= 210^\circ + 360^\circ \\ &= 570^\circ \end{aligned}$$

$$\begin{aligned} x_4 &= 330^\circ + 360^\circ \\ &= 690^\circ \end{aligned}$$

