Trigonometric Equations

$\sin\theta = 0.5$ $\quad\quad$ $\cos\theta = -0.75$ $\quad\quad$ (simple)

① RAA ② CAST → quadrants ③ solve for θ_1, θ_2

④ coterminal angles?

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

let $x = 2\theta$

① RAA?

$\sin RAA = 0.5$

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

$RAA = 30°$

Solve for θ, $0° \le \theta < 360°$

② Quadrants?

S⁺	A⁺
T	C

$\sin x < 0$

Q3 or Q4

Q3: $x_1 = 180° + 30°$
$= 210°$

Q4: $x_2 = 360° - 30°$
$= 330°$

$0° \le \theta < 360°$ [×2]

$0° \le 2\theta < 720°$

$0° \le x < 720°$

→ need to consider additional coterminal angles for x

$x_3 = 210° + 360°$
$= 570°$

$x_4 = 330° + 360°$
$= 690°$

recall: $x = 2\theta$

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

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

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

$\theta_1 = \frac{x_1}{2}$ $\quad \theta_3 = \frac{x_3}{2}$

$= \frac{210^\circ}{2}$ $\quad = \frac{570^\circ}{2}$

$= 105^\circ$ $\quad = 285^\circ$

need to consider additional coterminal angles for x

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

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

$\theta_2 = \frac{x_2}{2}$ $\quad \theta_4 = \frac{x_4}{2}$

$= \frac{330^\circ}{2}$ $\quad = \frac{690^\circ}{2}$

$= 165^\circ$ $\quad = 345^\circ$