values that satisfy an equation called solutions

ex: determine if $\theta = \frac{\pi}{4}$ is a solution to the equation.

$$2 \sin \theta - 1 = 0$$
$$2 \sin \left(\frac{\pi}{4}\right) - 1 = 0$$
$$2 \left(\frac{\sqrt{2}}{2}\right) - 1 = 0$$
$$\sqrt{2} - 1 = 0$$
$$\sqrt{2} \neq 1$$

No \ $\frac{\pi}{4}$ not a solution

$\theta = \frac{\pi}{6}$ is a solution

$$2 \sin \left(\frac{\pi}{6}\right) - 1 = 0$$
$$2 \left(\frac{1}{2}\right) - 1 = 0$$
$$1 - 1 = 0$$

$$(3, \frac{1}{2})$$

$$(\frac{\pi}{6}, 0)$$

$$(\frac{\pi}{2}, 1)$$

$$(\pi, 0)$$

$$(\frac{3\pi}{2}, -1)$$

$$(2\pi, 0)$$
\[ \theta = \frac{\pi}{6} + 2k\pi \]

\[ \theta = \frac{\pi}{6} + 2k\pi \]

\[ = \frac{13\pi}{6} \]

\[ \theta = \frac{5\pi}{6} + 2k\pi \]

\[ = \frac{17\pi}{6} \]

\[ \cos \theta = \frac{1}{2} \]

Solve, give general form and eight solutions

\[ (0, 2\pi) \]

\[ T = 2\pi \]

\[ 3\sin(2\theta) = \frac{1}{2} \]

\[ 2\theta = \alpha_1 = \frac{\pi}{6} + 2k\pi \]

\[ 2\theta = \alpha_1 = \frac{5\pi}{6} + 2k\pi \]

\[ \theta = \frac{\pi}{12} + k\pi \]

\[ \theta = \frac{5\pi}{12} + k\pi \]
\[ \tan \left( \theta - \frac{\pi}{2} \right) = 1 \]
\[ \theta - \frac{\pi}{2} = \frac{\pi}{4} + K\pi \]
\[ \theta = \frac{3\pi}{4} + K\pi \]
\[ \theta = \frac{3\pi}{4} + K\pi \]

**Andrachic in form**

**Solve**

\[ 2\sin^2 \theta - 3\sin \theta + 1 = 0 \quad 0 < \theta < 2\pi \]

\[ 2\sin^2 \theta - 2\sin \theta - \sin \theta + 1 = 0 \]

\[ 2\sin \theta (\sin \theta - 1) - 1(\sin \theta - 1) = 0 \]

\[ (\sin \theta - 1)(2\sin \theta - 1) = 0 \]

\[ \sin \theta = 1 \]
\[ \sin \theta = \frac{1}{2} \]

\[ \theta = \frac{\pi}{6}, \frac{5\pi}{6} \]

\[ \theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2} \]
Solve:

\[ 3 \cos \theta + 3 = 2 \sin \theta \quad 0 \leq \theta < 2\pi \]

\[ 3 \cos \theta + 3 = 2 - 2 \cos \theta \]

\[ 3 \cos \theta + 2 \cos \theta + 1 = 0 \]

\[ 2 \cos^2 \theta + 3 \cos \theta + 1 = 0 \]

\[ (2 \cos \theta + 1)(\cos \theta + 1) = 0 \]

\[ \cos \theta = -\frac{1}{2} \quad \theta = 1.57, 1.88 \quad (-1, 0) \]

\[ \cos^2 \theta + \sin^2 \theta = 2 \]

\[ 1 - \sin^2 \theta + \sin^2 \theta - 2 = 0 \]

\[ 1 = \sin^2 \theta - \sin \theta + 1 = 0 \]

\[ \sqrt{b^2 - 4ac} > 0 \quad \text{for having solutions.} \]

\[ a = 1, \quad b = -1, \quad c = 1 \]

\[ \sqrt{(1)^2 - 4 \cdot 1 \cdot 1} \]

\[ = \sqrt{1 - 4} \]

\[ = \sqrt{-3} \quad \text{no real solutions.} \]
ex: solve:

\[5 \sin x + x = 3\]

\[y_1 = 5 \sin x + x\]

\[y_2 = 3\]