

$$(x + 6)(x + 1)$$

$$x^2 + 7x + 6$$

$$= \begin{matrix} \uparrow & \uparrow \\ \text{ADD} & \text{MULT} \end{matrix}$$

$$x^2 + 8x + 15 = 0 \quad \checkmark$$

$$(x + 3)(x + 5) = 0 \quad \checkmark$$

$$x + 3 = 0$$

$$\underline{\underline{x = -3}}$$

$$x + 5 = 0$$

$$\underline{\underline{x = -5}}$$

* Set equal to zero

* Factor

* Set each factor equal to zero and solve

$$\sin^2 x + 3\sin x - 4 = 0$$

$$b^2 + 3b - 4 = 0$$

← ADD ← MULT

$$(b + 4)(b - 1) = 0$$

$$b + 4 = 0$$

$$\sin x + 4 = 0$$

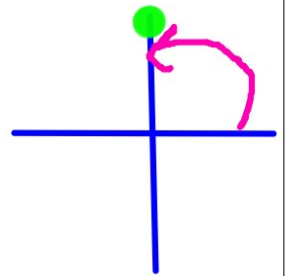
$$\sin x = -4$$

$$x = \sin^{-1}(-4)$$

NO SOLUTION

Let $\underline{\underline{\sin x = b}}$

$$[0, 2\pi)$$



$$b - 1 = 0$$

$$\sin x - 1 = 0$$

$$\sin x = 1$$

$$x = \sin^{-1}(1)$$

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

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

$$b^2 - 2b - 3 = 0 \quad \leftarrow \text{MULT}$$

$$(b + 1)(b - 3) = 0$$

$$b + 1 = 0$$

$$\cos x + 1 = 0$$

$$\cos x = -1$$

$$\boxed{x = \pi}$$

$$\underline{\underline{\cos x = b}}$$

$$[0, 2\pi)$$

$$b - 3 = 0$$

$$\cos x - 3 = 0$$

$$\cos x = 3$$

* NO SOLUTION

$$\sin^2 x + 3\sin x + 7 = 5$$

$$\sin^2 x + 3\sin x + 2 = 0$$

$$b^2 + 3b + 2 = 0$$

$$(b + 1)(b + 2) = 0$$

$$b + 2 = 0$$

$$b + 1 = 0$$

$$\sin x + 1 = 0$$

$$\sin x = -1$$

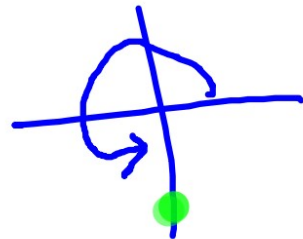
$$x = \frac{3\pi}{2}$$

$$\sin x + 2 = 0$$

$$\sin x = -2$$

NO SOLUTION

(-5)
let $b = \sin x$



$[0, 2\pi)$

$$(*) \cos x \cdot \tan x + \cos x = 0$$

Factor out
GCF
($\cos x$)

$$\underline{\cos x} (\underline{\tan x + 1}) = 0$$

$$\cos x = 0$$

or

$$\tan x + 1 = 0$$

$$x = \cos^{-1} 0$$

$$\tan x = -1$$

$$x = \pi$$

or

$$x = \frac{3\pi}{2}$$

$$x = \frac{3\pi}{4}$$

or

$$x = \frac{7\pi}{4}$$

$$\sin x \cdot \tan x = \sin x \quad [0, 2\pi)$$

$$\sin x \cdot \tan x - \sin x = 0$$

$$\underline{\sin x} (\underline{\tan x - 1}) = 0$$

$$\sin x = 0$$

$$x = 0$$

or

$$x = \pi$$

$$\tan x - 1 = 0$$

$$\tan x = 1$$

$$x = \frac{\pi}{4}$$

or

$$x = \frac{5\pi}{4}$$

$\frac{\pi}{4}$

4

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

$$\sin^2 x \underline{\cos x} - \underline{\cos x} = 0$$

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

$$\cos x = 0$$

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

or

$$x = \frac{3\pi}{2}$$

$$\sin^2 x - 1 = 0$$
$$\sqrt{\sin^2 x} = \sqrt{1}$$

$$\sin x = \pm 1$$

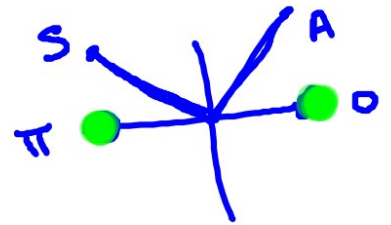
$$x = \frac{\pi}{2}$$

or

$$x = \frac{3\pi}{2}$$

5

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



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

$$\sqrt{\tan^2 x} = \sqrt{0}$$

$$\tan x = 0$$

$$\begin{aligned} x &= 0 \\ \text{or} \\ x &= \pi \end{aligned}$$

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

$$2 \sin x = 1$$

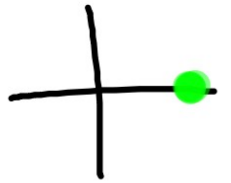
$$\sin x = \frac{1}{2}$$

$$\begin{aligned} x &= \frac{\pi}{6} \\ x &= \frac{5\pi}{6} \end{aligned}$$

$$\textcircled{b} \quad \cos x \csc x = \csc x$$

$$\cos x \csc x - \csc x = 0$$

$$\csc x (\cos x - 1) = 0$$



$$\csc x = 0$$
$$\frac{1}{\sin x} = 0$$

or

$$\sin x = \frac{1}{0} \text{ undefined}$$

NO SOLUTION

$$\cos x - 1 = 0$$

$$\cos x = 1$$
$$\boxed{x = 0} \quad \textcircled{\times}$$

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