7.2 Solving Trig Equations Algebraically

When solving a first degree equation, isolate the trig function.

ex 1 $5\sin x + 2 = 1 + 3\sin x$

$-3\sin x \quad\quad -3\sin x$

$2\sin x + 2 = 1$

$2\sin x = -1$

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

similar to

$5a + 2 = 1 + 3a$

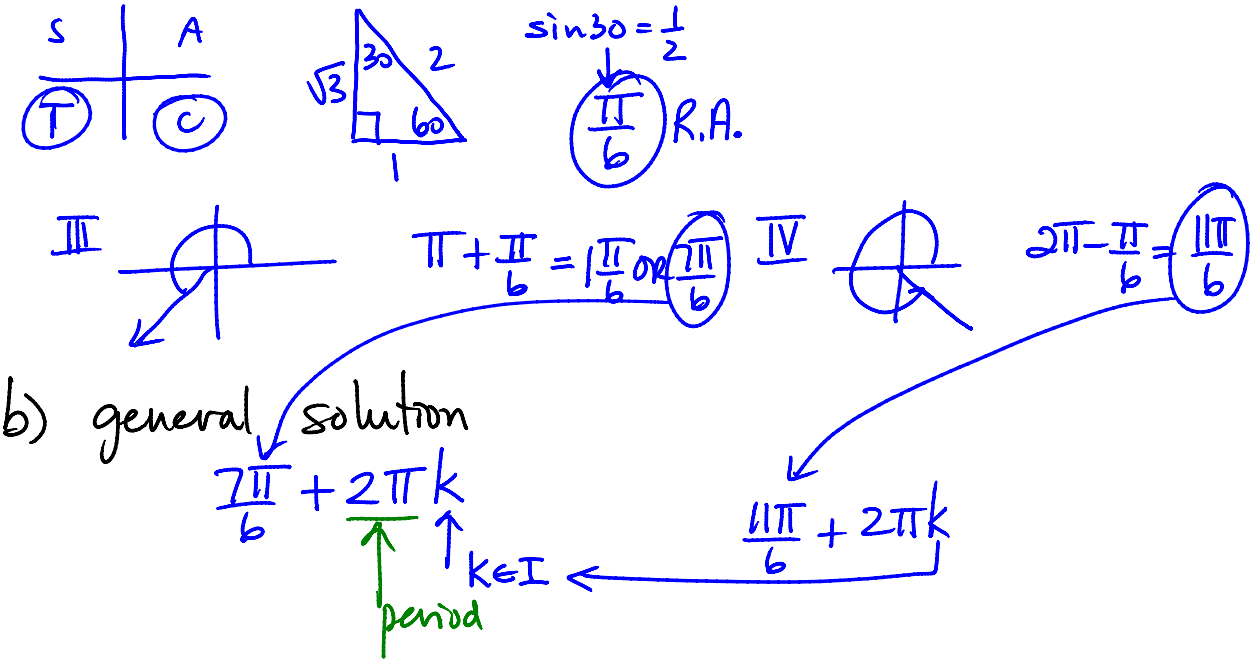
$-3a \quad\quad -3a$

$2a + 2 = 1$

$2a = -1$

$\boxed{a = -\frac{1}{2}}$

a) within a specific domain $\boxed{0 \le x < 2\pi}$



b) general solution

$\frac{7\pi}{6} + 2\pi k$, $k \in I$ ← $\frac{11\pi}{6} + 2\pi k$

2π = period

ex. 2 $3\csc x - 6 = 0$

$3\csc x = 6$

$\csc x = 2$

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

a) specific domain $0 \le x \le 360$

R.A = 30°

I → 30

II → 180 − 30 = 150

b) general solution

$30 + 360k$

$150 + 360k$ $\Big\rangle$ $k \in I$

ex.3 $\cos x - 6 = 4\cos x - 4$

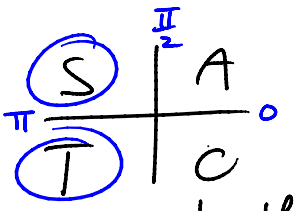
$-\cos x \qquad -\cos x$

$-6 = 3\cos x - 4$

$+4 \qquad +4$

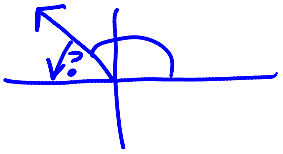
$-2 = 3\cos x$

$\boxed{\frac{-2}{3} = \cos x}$



to the nearest hundredth for $0 \le x \le 2\pi$

? R.A? → $\cos^{-1}(-2/3) = \boxed{2.30}$ (II)



$\pi - 2.30 = 0.841$ R.A.

III $= \pi + 0.841 = \boxed{3.98}$ (III)

general solution

$2.30 + 2\pi k$

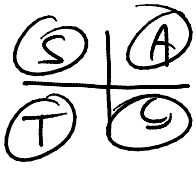
$3.98 + 2\pi k$

To solve a second degree trig. equation ....

Remember how to solve a quadratic !!!

ex.4 $2\cos^2 x = 1$

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



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

ALL QUADS

for $0 \le x \le 360$

(I) $= 45°$

(II) $180 - 45 = 135$

(III) $180 + 45 = 225$

(IV) $360 - 45 = 315$

$2x^2 = 1$

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

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

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ex.5 $3\cos^2 x + \cos x - 1 = 0$

$3a^2 + a - 1 = 0$ FACTOR OR

$$a = \frac{-1 \pm \sqrt{1 - -12}}{6}$$

FORMULA $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$a = \frac{-1 \pm \sqrt{13}}{6}$$

$\cos x = \frac{-1 \pm \sqrt{13}}{6}$ → when + → quad 1, 4

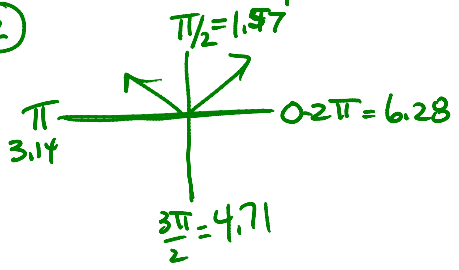
→ when − → quad 2, 3

$\cos x = \frac{-1 + \sqrt{13}}{6} \rightarrow x = 1.122$ ①

$\cos x = \frac{-1 - \sqrt{13}}{6} \quad x = 2.446$ ②

$-\pi \leq x \leq \pi$

3 dec. pl.



③ → $\pi + 1.122 = 4.264$

④ → $2\pi - 1.122 = 5.161$

p 592 # 4, 6, 7, 8a, 9a, 14 (pick 1)