Ex. $6\sin^2 x - \sin x = 2, -2\pi \le \theta \le 4\pi$

$6\sin^2 x - \sin x - 2 = 0$ (-12)

$6\sin^2 x - 4\sin x + 3\sin x - 2 = 0$

$2\sin x(3\sin x - 2) + 1(3\sin x - 2) = 0$

$(2\sin x + 1)(3\sin x - 2) = 0$

$\sin x = \frac{-1}{2}$ (y)

$(x, \frac{-1}{2})$

Ref $\frac{\pi}{6}$, Q 3,4)

$+2\pi \quad +2\pi$

$x = \frac{7\pi}{6}, \frac{11\pi}{6}$

$= \frac{19\pi}{6}, \frac{23\pi}{6}$

$-\frac{5\pi}{6}, -\frac{\pi}{6}$

$\sin x = \frac{2}{3}$ (+)

(Ref ± 0.73; Q 1,2)

$\pi - \theta$	θ
$\pi + \theta$	$2\pi - \theta$

$x = 0.73, 2.41, 7.01, 8.69$

$-5.55, -3.87$

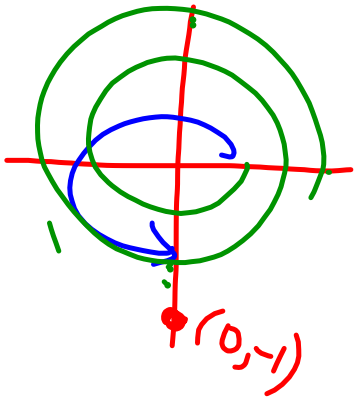
In-Class Asst:

$(\sin x + \frac{1}{2})(\sin x + 1) = 0$

$-4\pi \leq x < 2\pi$

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

$\sin x = -1$



$x = -\frac{4\pi}{2}, \frac{3\pi}{2}, -\frac{\pi}{2}, -\frac{5\pi}{2}$

$-\frac{3\pi}{2}$

$$\cos^3\theta - 2\cos^2\theta + \cos\theta = 0$$

$$\cos\theta(\cos^2\theta - 2\cos\theta + 1) = 0$$

$$\cos\theta(\cos\theta - 1)(\cos\theta + 1) = 0$$

General Solution of a Trigonometric Equation

Solve: $3\cos^2\theta - \cos\theta = 2;\ \theta \in \mathbb{R}$ (degrees)

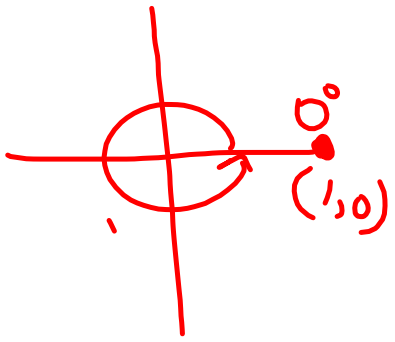
$3\cos^2\theta - \cos\theta - 2 = 0$ (−6)

$3\cos^2\theta - 3\cos\theta + 2\cos\theta - 2 = 0$

$3\cos\theta(\cos\theta - 1) + 2(\cos\theta - 1) = 0$

$(\cos\theta - 1)(3\cos\theta + 2) = 0$

(x) $\cos\theta = 1$



$x = 0° + 360°k, k \in I$

$\cos\theta = -\frac{2}{3}$

(Ref ∠ 48°, Q2,3)

$\theta = 132° + 360k, k \in I$

$\theta = 228° + 360k, k \in I$

Determine the general solution for $\sin^2 x - 1 = 0$ over the real numbers if x is measured in radians.

$\sin^2 x - 1 = 0$

$(\sin x - 1)(\sin x + 1) = 0$

$\sin x = 1$ or $\sin x = -1$

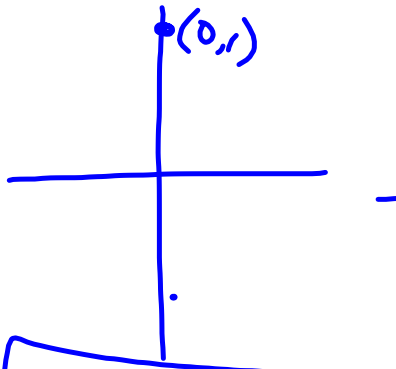
$\sqrt{\sin^2 x} = \sqrt{1}$

$\sin x = \pm 1$

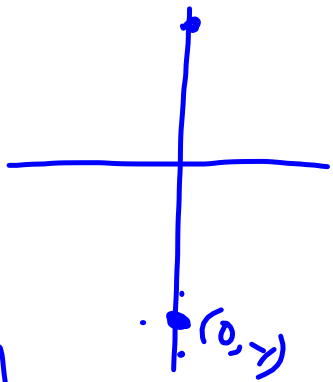
Did You Know?

$2n$, where $n \in \mathrm{I}$, represents all even integers.

$2n + 1$, where $n \in \mathrm{I}$, is an expression for all odd integers.



$x = \frac{\pi}{2} + 2\pi k, k \in I$



$x = \frac{3\pi}{2} + 2\pi k, k \in I$

✓

$x = \frac{\pi}{2} + 2\pi n$, where $n \in \mathrm{I}$

$x = \frac{3\pi}{2} + 2\pi n$, where $n \in \mathrm{I}$

or

$x = \frac{\pi}{2} + \pi n$, where $n \in \mathrm{I}$

or

$(2n + 1)\left(\frac{\pi}{2}\right)$, $n \in \mathrm{I}$

ex. 2

$-5.8 = 7\sin(t+3.8) - 4.5$

- Radians
- 1st 3 times

$t = 2.27s, 5.81sec, 8.57sec$

$\frac{-5.8+4.5}{7} = \frac{7\sin(t+3.8)}{7}$

$-\frac{1.3}{7} = \sin(t+3.8)$

$\sin(40°+50°)$

$\sin 40° + \sin 50°$

$\sin^{-1}\left(-\frac{1.3}{7}\right) = \sin^{-1}(\sin(t+3.8))$

$\sin^{-1}\left(\frac{1.3}{7}\right) = t+3.8$

(Ref $\angle$ 0.19, Q3,4)

Q3: $\pi + 0.19 = 3.33$

$3.33 = t+3.8$

$t = -0.47$ sec

$+2\pi$

$t = 5.81$ sec

Q4: $2\pi - 0.19 = 6.09$

$6.09 = t+3.8$

$t = 2.29$ sec

$+2\pi$

$t = 9.57$

Practice Problems:

Pages 212 - 214
#11 - 23

Check-Up problem...

Solve: $\sin x \sec x + 2\sin x = 0 \ , \ x \in R$ (x is measured in radians)

Find 2 times

② $3.8 = 8.6\cos\left[\frac{\pi}{5}(t+3)\right] - 2.3$

$3.8 + 2.3 = 8.6\cos\left(\frac{\pi}{5}(t+3)\right)$

$\frac{6.1}{8.6} = \cos\left(\frac{\pi}{5}(t+3)\right)$

$\cos^{-1}\left(\frac{6.1}{8.6}\right) = \frac{\pi}{5}(t+3)$

$\cos\theta = \frac{6.1}{8.6}$

(Ref ∠ 0.78, Q1,4)

$\theta = 0.78$ or $2\pi - 0.78 = 5.50$

Q1

$\left(\frac{5}{\pi}\right)0.78 = \frac{\pi}{5}(t+3)$

$\frac{5}{\pi}(0.78) - 3 = t$

$t = -1.76$

Q4

$5.50 = \frac{\pi}{5}(t+3)$

$\frac{5}{\pi}(5.5) - 3 = t$

$t = 5.75$

Unit Review...

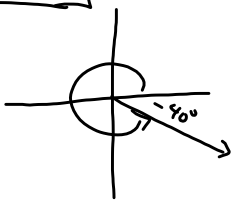
What topics have we covered??

→ Radians ↔ Degrees

→ Calculations: $\theta = \frac{a}{r}$ Must be Radians

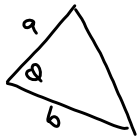
→ Principal Angles

→ Co-terminal Angles

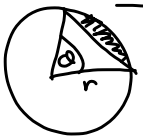


→ Formula:

Triangle: $A = \frac{1}{2}ab\sin\theta$



Sector: Degrees $A = \left(\frac{\theta}{360}\right)\pi r^2$ OR Radians $A = \frac{\theta r^2}{2}$

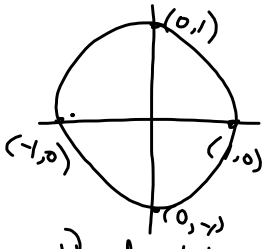


Segment: $A_{Seg.} = A_{Sector} - A_{Triangle}$

Angular Velocity $V_A = \frac{\theta}{t}$

Trigonometry of Rotation Angles

⇒ Special Angles in Radians



$\left(\frac{\pi}{6}\right)$ 30° ⇒ $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

$\left(\frac{\pi}{3}\right)$ 60° ⇒ $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

$\left(\frac{\pi}{4}\right)$ 45° ⇒ $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

Quadrantals

Trig. Equations

→ Linear

→ Quadratic

→ Ugly Linear!!

Review:

Pg. 215

#1, 2, 3, 4, 5, 6, 12, 13, 14, 15, 16, 18, 20, 21, 23

Pg. 218

#1, 2, 3, 5, 6, 12, 13, 15, 16

Attachments

Worksheet - Sketching Angles in Radians.doc