HW12 & HW13 Solutions

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

$\cos\theta = 1$ or $\sin\theta = -1$

$\theta = \frac{3\pi}{2} + 2\pi n$ for any integer.

$\theta = 0 + 2\pi n$ for an integer n

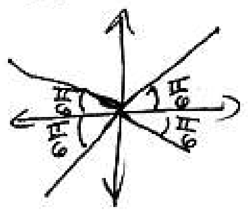
$\theta = 2\pi n$

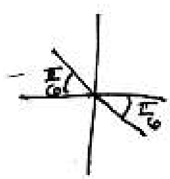
(29) $\cot^2 x - 3 = 0$

$\cot^2 x = 3$

$\cot x = \pm\sqrt{3}$

$\cot x = \sqrt{3}$ or $\cot x = -\sqrt{3}$





$\left.\begin{array}{l} \frac{\pi}{6} + 2\pi n \\ \frac{7\pi}{6} + 2\pi n \end{array}\right\}$ gives $\frac{\pi}{6} + \pi n$ or $\frac{5\pi}{6} + \pi n$

(43) $\tan^2 x \sin x = \sin x$

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

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

$\sin x = 0$ $\quad$ $\tan^2 x - 1 = 0$

$\tan^2 x = 1$

~~$x = \pi n$ for integer.~~ $\quad$ $\tan x = \pm 1$.

$x = 0, \pi$ $\quad$ $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$.

(45) $2\cos^2 t + 3\cos t + 1 = 0$

$(2\cos^2 t + 2\cos t) + (\cos t + 1) = 0$

$2\cos t(\cos t + 1) + 1(\cos t + 1) = 0$

$(\cos t + 1)(2\cos t + 1) = 0$

$\cos t = -1$ or $\cos t = \frac{-1}{2}$.

$t = \pi$ $\qquad t = \frac{2\pi}{3}$ or $\frac{4\pi}{3}$.

(61) $\sin^2 t - 4\sin t + 1 = 0$

Let $y = \sin t$ then $y^2 - 4y + 1 = 0$

If we use the quadratic formula we get

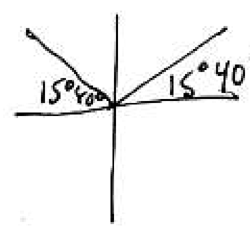
$$y = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)} = \frac{4 \pm \sqrt{16-4}}{2}$$

$$y = \frac{4 \pm \sqrt{12}}{2} = 2 \pm \sqrt{3}.$$

So $\sin t = 2 + \sqrt{3}$ or $\sin t = 2 - \sqrt{3}$

$\sin t \approx 3.73$ $\qquad \sin t = 0.27$

No Solution $\qquad t = 15°40'$



or $180° - 15°40'$

$= 164°20'$

Section 7.3

(5) (a) $\cos\left(\frac{\pi}{4}\right) + \cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} = \frac{\sqrt{2}+\sqrt{3}}{2}$

(b) $\cos\left(\frac{5\pi}{12}\right) = \cos\left(\frac{\pi}{4} + \frac{\pi}{6}\right)$

$= \cos\frac{\pi}{4}\cos\frac{\pi}{6} - \sin\frac{\pi}{4}\sin\frac{\pi}{6}$

$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2}$

$= \frac{\sqrt{6}-\sqrt{2}}{4}$.