

Mathematics 1613: Trigonometry Quiz #7

**Problem 23:** Completely solve the following trigonometric equations:

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

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

$$\begin{array}{l} \swarrow \quad \quad \quad \searrow \\ 2\sin x - 1 = 0 \quad \text{or} \quad \sin x + 2 = 0 \\ \sin x = \frac{1}{2} \quad \quad \quad \text{not possible} \end{array}$$

$$\boxed{\frac{\pi}{6} + 2\pi k \quad \frac{5\pi}{6} + 2\pi k}$$

(2)  $\tan 3\beta = -\sqrt{3}$  put  $\theta = 3\beta$

$$\tan \theta = -\sqrt{3}$$

$$\theta = \frac{2\pi}{3} + \pi k \quad \text{or} \quad \theta = \frac{5\pi}{3} + \pi k$$

$$3\beta = \frac{2\pi}{3} + \pi k \Rightarrow \beta = \frac{2\pi}{9} + \frac{\pi}{3}k$$

$$3\beta = \frac{5\pi}{3} + \pi k \Rightarrow \beta = \frac{5\pi}{9} + \frac{\pi}{3}k$$

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

$$\cos \theta = -\frac{1}{2}$$

$$\boxed{\frac{2\pi}{3} + 2\pi k \quad \frac{4\pi}{3} + 2\pi k}$$

(4)  $\tan^2 \theta = 3$

$$\tan \theta = \sqrt{3} \quad \text{or} \quad \tan \theta = -\sqrt{3}$$

$$\theta = \begin{array}{cc} \frac{\pi}{3} + \pi k & \frac{4\pi}{3} + \pi k \\ \frac{2\pi}{3} + \pi k & \frac{5\pi}{3} + \pi k \end{array}$$

these are repetitive, so you didn't need to include them