

Math 121 – Quiz 5 Solution

Given

$$\sin \theta = \frac{2}{3}, \quad 0 < \theta < \frac{\pi}{2} \quad \text{and} \quad \cos \beta = -\frac{3}{5}, \quad \frac{\pi}{2} < \beta < \pi$$

compute the following:

(a) $\sin 2\theta$ (b) $\cos(\theta + \beta)$ (c) $\sin(\theta - \beta)$

Solution:

$$1. \sin 2\theta = 2 \sin \theta \cos \theta = 2 \left(\frac{2}{3}\right) \left(\frac{\sqrt{5}}{3}\right) = \frac{4\sqrt{5}}{9}$$

$$2. \cos(\theta + \beta) = \cos \theta \cos \beta - \sin \theta \sin \beta = \left(\frac{\sqrt{5}}{3}\right) \left(-\frac{3}{5}\right) - \left(\frac{2}{3}\right) \left(\frac{4}{5}\right) = \frac{-3\sqrt{5} - 8}{15}$$

$$3. \sin(\theta - \beta) = \sin \theta \cos \beta - \cos \theta \sin \beta = \left(\frac{2}{3}\right) \left(-\frac{3}{5}\right) - \left(\frac{\sqrt{5}}{3}\right) \left(\frac{4}{5}\right) = \frac{-6 - 4\sqrt{5}}{15}$$