

Math 121 – Quiz 5 Solution

Given

$$\sin \theta = \frac{2}{5}, \quad 0 < \theta < \frac{\pi}{2} \quad \text{and} \quad \cos \beta = -\frac{1}{5}, \quad \frac{\pi}{2} < \beta < \pi$$

compute the following:

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

Solution:

1. $\cos 2\beta = 2 \cos^2 \beta - 1 = 2 \left(-\frac{1}{5}\right)^2 - 1 = -\frac{23}{25}$

2. $\cos(\theta + \beta) = \cos \theta \cos \beta - \sin \theta \sin \beta = \left(\frac{\sqrt{21}}{5}\right) \left(-\frac{1}{5}\right) - \left(\frac{2}{5}\right) \left(\frac{2\sqrt{6}}{5}\right) = \frac{-\sqrt{21} - 4\sqrt{6}}{25}$

3. $\sin(\theta - \beta) = \sin \theta \cos \beta - \cos \theta \sin \beta = \left(\frac{2}{5}\right) \left(-\frac{1}{5}\right) - \left(\frac{\sqrt{21}}{5}\right) \left(\frac{2\sqrt{6}}{5}\right) = \frac{-2 - 6\sqrt{14}}{25}$