

Answer on Question #81503 — Math — Trigonometry

Question

Find the exact value of the expression?

$\sin a = 24/25$, a lies in quadrant 2 and $\cos B = 2/5$, B lies in quadrant 1. Find $\cos(a-b)$.

Solution

$\sin(a) = 24/25$, a in 2 quadrant.

$\cos(b) = 2/5$, b in 1 quadrant.

$$\cos(a - b) = \cos(a) \cdot \cos(b) + \sin(a) \cdot \sin(b)$$

$$\cos(a) = \pm \sqrt{1 - \sin(a)^2} = \pm \frac{7}{25}.$$

If a lies in 2 quadrant, $\cos(a) < 0$.

$$\cos(a) = -7/25$$

$$\sin(b) = \pm \sqrt{1 - \cos(b)^2} = \pm \frac{\sqrt{21}}{5}. \text{ If } b \text{ lies in 1 quadrant, } \sin(b) > 0.$$

$$\sin(b) = \frac{\sqrt{21}}{5}.$$

$$\cos(a - b) = \cos(a) \cdot \cos(b) + \sin(a) \cdot \sin(b) = -\frac{2}{5} \cdot \frac{7}{25} + \frac{24}{25} \cdot \frac{\sqrt{21}}{5} = \frac{24\sqrt{21}-14}{625}$$

$$\textbf{Answer: } \frac{24\sqrt{21}-14}{625}.$$