

Unit 6: Trig Identities and Equations

Lesson 3: Sum and Difference Formulas

Answers p. 408 #35 – 42

For Exercises 35–37, we have:

$$\sin u = \frac{5}{13}, u \text{ is in Quadrant I} \Rightarrow \cos u = \frac{12}{13}$$

$$\cos v = -\frac{3}{5}, v \text{ is in Quadrant II} \Rightarrow \sin v = \frac{4}{5}$$

$$\begin{aligned} 35. \sin(u + v) &= \sin u \cos v + \cos u \sin v \\ &= \left(\frac{5}{13}\right)\left(-\frac{3}{5}\right) + \left(\frac{12}{13}\right)\left(\frac{4}{5}\right) \\ &= \frac{33}{65} \end{aligned}$$

$$\begin{aligned} 37. \cos(u + v) &= \cos u \cos v - \sin u \sin v \\ &= \left(\frac{12}{13}\right)\left(-\frac{3}{5}\right) - \left(\frac{5}{13}\right)\left(\frac{4}{5}\right) \\ &= \frac{-56}{65} \end{aligned}$$

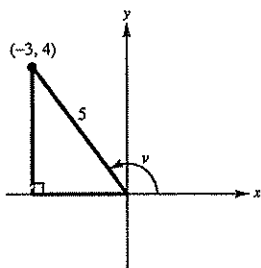
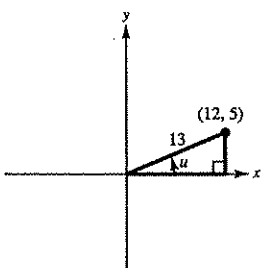
For Exercises 39–41, we have:

$$\sin u = \frac{7}{25}, u \text{ is in Quadrant II} \Rightarrow \cos u = -\frac{24}{25}$$

$$\cos v = \frac{4}{5}, v \text{ is in Quadrant IV} \Rightarrow \sin v = -\frac{3}{5}$$

$$\begin{aligned} 39. \cos(u + v) &= \cos u \cdot \cos v - \sin u \cdot \sin v \\ &= \left(-\frac{24}{25}\right)\left(\frac{4}{5}\right) - \left(\frac{7}{25}\right)\left(-\frac{3}{5}\right) \\ &= \frac{-96 + 21}{125} = \frac{-75}{125} = \frac{-3}{5} \end{aligned}$$

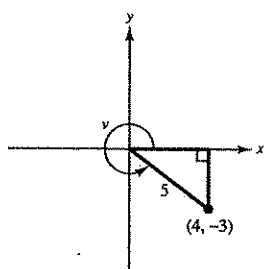
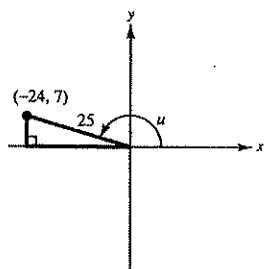
$$\begin{aligned} 41. \sin(v - u) &= \sin v \cdot \cos u - \sin u \cdot \cos v \\ &= \left(-\frac{3}{5}\right)\left(-\frac{24}{25}\right) - \left(\frac{7}{25}\right)\left(\frac{4}{5}\right) \\ &= \frac{72 - 28}{125} = \frac{44}{125} \end{aligned}$$



Figures for Exercises 36 and 38

$$\begin{aligned} 36. \cos(v - u) &= \cos v \cos u + \sin v \sin u \\ &= \left(-\frac{3}{5}\right)\left(-\frac{24}{25}\right) + \left(\frac{4}{5}\right)\left(\frac{5}{13}\right) \\ &= \frac{36}{65} + \frac{20}{65} = \frac{56}{65} \end{aligned}$$

$$\begin{aligned} 38. \sin(u - v) &= \sin u \cos v - \cos u \sin v \\ &= \left(\frac{5}{13}\right)\left(-\frac{3}{5}\right) - \left(-\frac{24}{25}\right)\left(\frac{4}{5}\right) \\ &= \frac{-15}{65} - \frac{48}{65} = \frac{-63}{65} \end{aligned}$$



Figures for Exercises 40 and 42

$$\begin{aligned} 40. \sin(u + v) &= \sin u \cos v + \cos u \sin v \\ &= \left(\frac{7}{25}\right)\left(\frac{4}{5}\right) + \left(-\frac{24}{25}\right)\left(-\frac{3}{5}\right) \\ &= \frac{28}{125} + \frac{72}{125} = \frac{100}{125} = \frac{4}{5} \end{aligned}$$

$$\begin{aligned} 42. \cos(u - v) &= \cos u \cos v + \sin u \sin v \\ &= \left(-\frac{24}{25}\right)\left(\frac{4}{5}\right) + \left(\frac{7}{25}\right)\left(-\frac{3}{25}\right) \\ &= \frac{-96}{125} + \frac{-21}{125} = \frac{-117}{125} \end{aligned}$$