

Find the measure of the angle between the two vectors.

$$1) \begin{aligned} \mathbf{u} &= \langle -5, 5 \rangle \\ \mathbf{v} &= \langle -7, -4 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{15}{\sqrt{50} \cdot \sqrt{65}} \right)$$

$$= \cos^{-1} \left( \frac{15}{\sqrt{3250}} \right)$$

$74.74^\circ$

$$2) \begin{aligned} \mathbf{u} &= \langle 3, -6 \rangle \\ \mathbf{v} &= \langle 2, -3 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{24}{\sqrt{45} \cdot \sqrt{13}} \right)$$

$$= \cos^{-1} \left( \frac{24}{\sqrt{585}} \right)$$

$7.13^\circ$

$$3) \begin{aligned} \mathbf{u} &= \langle -3, 1 \rangle \\ \mathbf{v} &= \langle -8, 0 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{24}{\sqrt{10} \cdot \sqrt{64}} \right)$$

$$= \cos^{-1} \left( \frac{24}{\sqrt{640}} \right)$$

$18.43^\circ$

$$4) \begin{aligned} \mathbf{u} &= \langle -5, 7 \rangle \\ \mathbf{v} &= \langle 4, 8 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{36}{\sqrt{74} \cdot \sqrt{80}} \right)$$

$$= \cos^{-1} \left( \frac{36}{\sqrt{5920}} \right)$$

$62.10^\circ$

$$5) \begin{aligned} \mathbf{u} &= \langle -6, 9 \rangle \\ \mathbf{v} &= \langle -3, -2 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{0}{\sqrt{\quad}} \right)$$

$90^\circ$

↑  
doesn't matter!

$$6) \begin{aligned} \mathbf{u} &= \langle 9, 5 \rangle \\ \mathbf{v} &= \langle 3, -5 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{12}{\sqrt{106} \cdot \sqrt{34}} \right)$$

$$= \cos^{-1} \left( \frac{2}{\sqrt{3604}} \right)$$

$88.09^\circ$

$$7) \begin{aligned} \mathbf{u} &= \langle -9, 6 \rangle \\ \mathbf{v} &= \langle -9, 8 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{129}{\sqrt{117} \cdot \sqrt{145}} \right)$$

$$= \cos^{-1} \left( \frac{129}{\sqrt{16965}} \right)$$

$7.94^\circ$

$$8) \begin{aligned} \mathbf{u} &= \langle 4, -4 \rangle \\ \mathbf{v} &= \langle 3, 3 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{0}{\sqrt{\quad}} \right)$$

$90^\circ$

$$9) \begin{aligned} \mathbf{u} &= \langle 3, 8 \rangle \\ \mathbf{v} &= \langle -5, 4 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{17}{\sqrt{73} \cdot \sqrt{41}} \right)$$

$$= \cos^{-1} \left( \frac{17}{\sqrt{2993}} \right)$$

$71.90^\circ$

$$10) \begin{aligned} \mathbf{u} &= \langle 9, -2 \rangle \\ \mathbf{v} &= \langle 0, -3 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{6}{\sqrt{85} \cdot \sqrt{9}} \right)$$

$$= \cos^{-1} \left( \frac{6}{\sqrt{765}} \right)$$

$77.47^\circ$

$$11) \begin{aligned} \mathbf{u} &= \langle 4, 1 \rangle \\ \mathbf{v} &= \langle 0, 5 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{5}{\sqrt{17} \cdot \sqrt{25}} \right)$$

$$= \cos^{-1} \left( \frac{5}{\sqrt{425}} \right)$$

$75.96^\circ$

$$12) \begin{aligned} \mathbf{u} &= \langle 9, -8 \rangle \\ \mathbf{v} &= \langle 5, 5 \rangle \end{aligned} \quad \theta = \cos^{-1} \left( \frac{5}{\sqrt{145} \cdot \sqrt{50}} \right)$$

$$= \cos^{-1} \left( \frac{5}{\sqrt{7250}} \right)$$

$86.63^\circ$