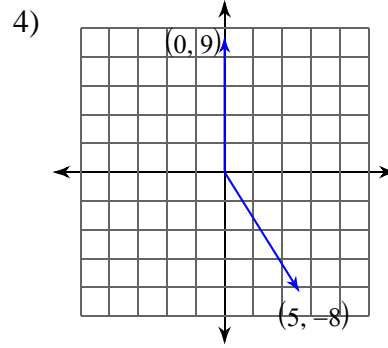
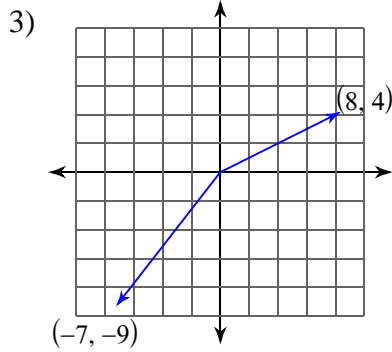


Two-Dimensional Vector Dot Products

Find the dot product of the given vectors.

1) $\vec{u} = \langle 3, 9 \rangle$
 $\vec{v} = \langle 6, 5 \rangle$

2) $\vec{u} = -\vec{i} + 5\vec{j}$
 $\vec{v} = -6\vec{i} - 2\vec{j}$

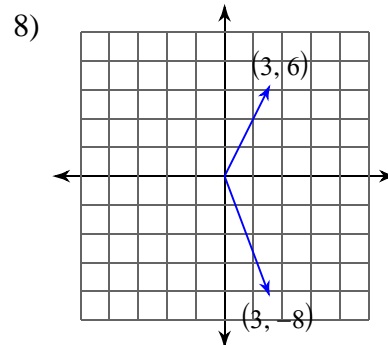
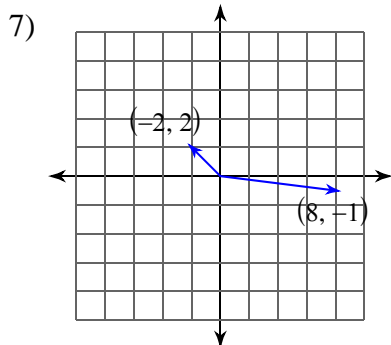


State if the two vectors are parallel, orthogonal, or neither.

5) $\vec{u} = \langle 4, -9 \rangle$
 $\vec{v} = \langle -9, 4 \rangle$

6) $\vec{u} = -5\vec{i} - 2\vec{j}$
 $\vec{v} = -10\vec{i} + 25\vec{j}$

Find the measure of the angle between the two vectors.



$$9) \begin{aligned} \vec{u} &= \langle -8, -2 \rangle \\ \vec{v} &= \langle -3, 3 \rangle \end{aligned}$$

$$10) \begin{aligned} \vec{u} &= -8\vec{j} \\ \vec{v} &= -9\vec{i} - 2\vec{j} \end{aligned}$$

Find the projection of u onto v.

$$11) \begin{aligned} \vec{u} &= \langle 8, 2 \rangle \\ \vec{v} &= \langle -7, -3 \rangle \end{aligned}$$

$$12) \begin{aligned} \vec{u} &= 5\vec{i} - 5\vec{j} \\ \vec{v} &= 7\vec{i} - 5\vec{j} \end{aligned}$$

Find the projection of u onto v. Then write u as the sum of two orthogonal vectors.

$$13) \begin{aligned} \vec{u} &= \langle -2, -3 \rangle \\ \vec{v} &= \langle -7, 9 \rangle \end{aligned}$$

Two-Dimensional Vector Dot Products

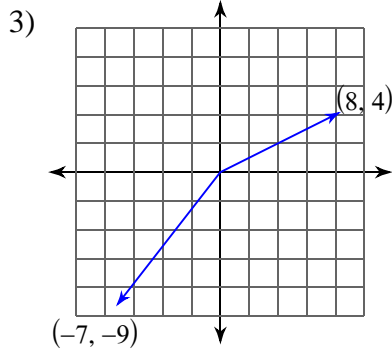
Find the dot product of the given vectors.

1) $\vec{u} = \langle 3, 9 \rangle$
 $\vec{v} = \langle 6, 5 \rangle$

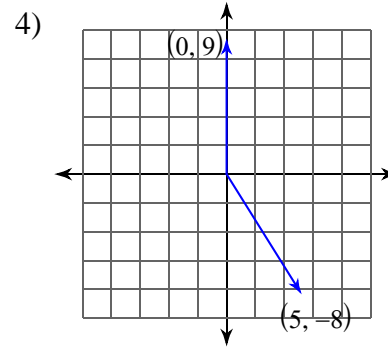
63

2) $\vec{u} = -\vec{i} + 5\vec{j}$
 $\vec{v} = -6\vec{i} - 2\vec{j}$

-4



-92



-72

State if the two vectors are parallel, orthogonal, or neither.

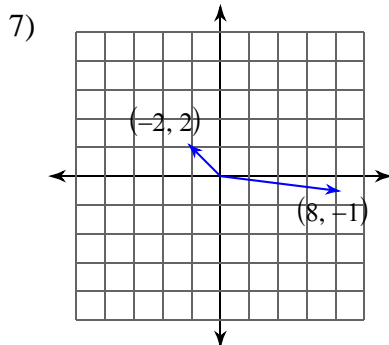
5) $\vec{u} = \langle 4, -9 \rangle$
 $\vec{v} = \langle -9, 4 \rangle$

Neither

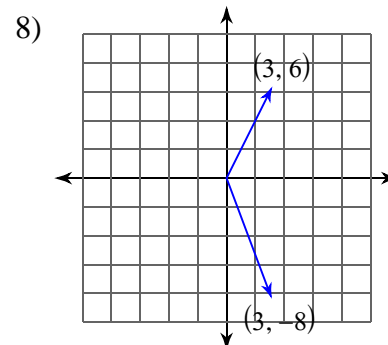
6) $\vec{u} = -5\vec{i} - 2\vec{j}$
 $\vec{v} = -10\vec{i} + 25\vec{j}$

Orthogonal

Find the measure of the angle between the two vectors.



142.13°



132.88°

$$9) \vec{u} = \langle -8, -2 \rangle$$

$$\vec{v} = \langle -3, 3 \rangle$$

$$59.04^\circ$$

$$10) \vec{u} = -8\vec{j}$$

$$\vec{v} = -9\vec{i} - 2\vec{j}$$

$$77.47^\circ$$

Find the projection of u onto v.

$$11) \vec{u} = \langle 8, 2 \rangle$$

$$\vec{v} = \langle -7, -3 \rangle$$

$$\left\langle \frac{217}{29}, \frac{93}{29} \right\rangle$$

$$12) \vec{u} = 5\vec{i} - 5\vec{j}$$

$$\vec{v} = 7\vec{i} - 5\vec{j}$$

$$\left\langle \frac{210}{37}, -\frac{150}{37} \right\rangle$$

Find the projection of u onto v. Then write u as the sum of two orthogonal vectors.

$$13) \vec{u} = \langle -2, -3 \rangle$$

$$\vec{v} = \langle -7, 9 \rangle$$

$$\left\langle \frac{7}{10}, -\frac{9}{10} \right\rangle$$

$$\vec{u} = \left\langle \frac{7}{10}, -\frac{9}{10} \right\rangle + \left\langle -\frac{27}{10}, -\frac{21}{10} \right\rangle$$