

6. Given a vector with initial point  $(5, 2)$  and terminal point  $(-1, -3)$ , find an equivalent vector whose initial point is  $(0, 0)$ . Write the vector in component form  $\langle a, b \rangle$ .
7. Given a vector with initial point  $(-4, 2)$  and terminal point  $(3, -3)$ , find an equivalent vector whose initial point is  $(0, 0)$ . Write the vector in component form  $\langle a, b \rangle$ .
8. Given a vector with initial point  $(7, -1)$  and terminal point  $(-1, -7)$ , find an equivalent vector whose initial point is  $(0, 0)$ . Write the vector in component form  $\langle a, b \rangle$ .

*For the following exercises, determine whether the two vectors  $\mathbf{u}$  and  $\mathbf{v}$  are equal, where  $\mathbf{u}$  has an initial point  $P_1$  and a terminal point  $P_2$  and  $\mathbf{v}$  has an initial point  $P_3$  and a terminal point  $P_4$ .*

9.  $P_1 = (5, 1)$ ,  $P_2 = (3, -2)$ ,  $P_3 = (-1, 3)$ , and  $P_4 = (9, -4)$
10.  $P_1 = (2, -3)$ ,  $P_2 = (5, 1)$ ,  $P_3 = (6, -1)$ , and  $P_4 = (9, 3)$
11.  $P_1 = (-1, -1)$ ,  $P_2 = (-4, 5)$ ,  $P_3 = (-10, 6)$ , and  $P_4 = (-13, 12)$
12.  $P_1 = (3, 7)$ ,  $P_2 = (2, 1)$ ,  $P_3 = (1, 2)$ , and  $P_4 = (-1, -4)$

13.  $P_1 = (8, 3)$ ,  $P_2 = (6, 5)$ ,  $P_3 = (11, 8)$ , and  $P_4 = (9, 10)$

14. Given initial point  $P_1 = (-3, 1)$  and terminal point  $P_2 = (5, 2)$ , write the vector  $\mathbf{v}$  in terms of  $\mathbf{i}$  and  $\mathbf{j}$ .

*For the following exercises, find the magnitude and direction of the vector,  $0 \leq \theta < 2\pi$ .*

28.  $\langle 0, 4 \rangle$

29.  $\langle 6, 5 \rangle$

30.  $\langle 2, -5 \rangle$

31.  $\langle -4, -6 \rangle$

32. Given  $\mathbf{u} = 3\mathbf{i} - 4\mathbf{j}$  and  $\mathbf{v} = -2\mathbf{i} + 3\mathbf{j}$ , calculate  $\mathbf{u} \cdot \mathbf{v}$ .

33. Given  $\mathbf{u} = -\mathbf{i} - \mathbf{j}$  and  $\mathbf{v} = \mathbf{i} + 5\mathbf{j}$ , calculate  $\mathbf{u} \cdot \mathbf{v}$ .