1. Find the vector that has initial point $(1,1)$ and terminal point $(3, -5)$.

2. Suppose $\vec{u} = \langle -2, 1 \rangle$ and $\vec{v} = \langle 0,3 \rangle$.
   a) Find $\|\vec{u}\|$.

   b) Find $5\vec{v} - 2\vec{u}$.

   c) Write $\vec{v}$ in terms of $\vec{\imath}$ and $\vec{\jmath}$.

   d) Find $\|-5\vec{v}\|$.

3. Find the direction (in degrees) of $\vec{v} = \langle -2, -3 \rangle$.

4. A ball is thrown with an initial speed of 20 miles per hour. The direction is $30°$ from the positive x-axis. Find the velocity vector $\vec{v}$. What is the initial speed in the horizontal direction? What is the initial speed in the vertical direction?

5. A boat is crossing a river that flows due south at 4 mi/h. The boat is heading due east at 5 mi/h relative to the water. Find the true velocity of the boat as a vector. Then find the true speed and direction of the boat.

Q: What goes up and down but doesn't move?

6. Find the vector from the point $(-1, 3)$ to the point $(0, 5)$. First, write the vector using component form. Then, write the vector in terms of $\vec{\imath}$ and $\vec{\jmath}$.

7. Find the vector from the point $(7, 0)$ to the point $(-2, -4)$. First, write the vector using component form. Then, write the vector in terms of $\vec{\imath}$ and $\vec{\jmath}$.

8. Suppose $\vec{u} = \langle 2, -1 \rangle$ and $\vec{v} = \langle -4, 3 \rangle$.
   a) Find $\|2\vec{u} - 3\vec{v}\|$.

   b) Find $\|5\vec{u}\| + \|\vec{v}\|$.

   c) Find $-\vec{v} + 2\vec{u}$.

   d) Find $-2(\vec{u} + 3\vec{v})$.

e) Find the direction (in degrees) of $\vec{u}$ from the positive x-axis.

f) Find the direction (in degrees) of $\vec{v}$ from the positive x-axis.

g) Find a unit vector in the direction of $\vec{u}$.

h) Find a unit vector in the direction of $\vec{v}$.

9.
    a) Write the following vectors in terms of $\vec{\imath}$ and $\vec{\jmath}$: $\langle 3, -2 \rangle$, $\langle -1, -5 \rangle$, $\langle 7, 0 \rangle$, $\langle 0, -23 \rangle$

    b) Write the following vectors in component form: $7\vec{\imath} + 3\vec{\jmath}$, $-13\vec{\imath} - \vec{\jmath}$, $-2\vec{\imath}$, $4\vec{\jmath}$

10. A ball is thrown with an initial speed of 50 miles per hour. The direction is $50°$ from the positive x-axis. (Round all values to 2 decimal places.)
    a) Find the velocity vector $\vec{v}$.

   b) What is the initial speed in the horizontal direction?

    c) What is the initial speed in the vertical direction?

11. A whiteboard marker is thrown with an initial speed of 10 miles per hour. The direction is $80°$ from the positive x-axis. (Round all values to 2 decimal places.)

a) Find the velocity vector $\vec{v}$.

b) What is the initial speed in the horizontal direction?

c) What is the initial speed in the vertical direction?

12. An airplane heads due south at 400 mi/h. It experiences a 50 mi/h crosswind blowing $S\ 30°\ W$. (Round all values to 2 decimal places.)

a) Find the velocity of the airplane relative to the ground.

b) What is the ground speed of the plane?

c) What is the plane's direction of movement relative to the ground?

13. A jet heads $N\ 40°\ W$ at 550 mi/h. It experiences a 70 mi/h crosswind blowing $N\ 10°\ E$. (Round all values to 2 decimal places.)
    a) Find the velocity of the jet relative to the ground.

    b) What is the ground speed of the jet?

    c) What is the jet's direction of movement relative to the ground?

14. A swimmer is swimming 2 mi/h (relative to the water) across a straight river flowing south at 1.4 mi/h. In what direction should the swimmer head in order to arrive at a landing point that's due east of him?

15. An airplane is flying 350 mi/h relative to the air. It experiences a 40 mi/h crosswind blowing due north. In what direction should the airplane head in order to arrive at a point due west of its location?

16. A 2000-pound concrete block is suspended from two cables as shown below. Find the tension in each cable.
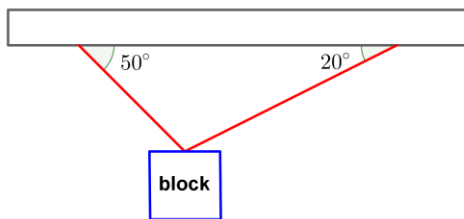
17. A 150-pound chandelier is suspended from two wires as shown below. Find the tension in each wire.
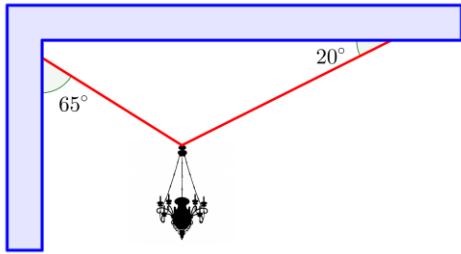
Optional exercises from the Sullivan book if you'd like more practice:
9.4 (p.606) #29-47 odd, 59-71 odd, 73, 77, 79, 83, 85, 87