WIR 2
Sections 1.2, 1.3, 2.2

1 Section 1.2

1. Find $\vec{a} \cdot \vec{b}$

   (a) if $\|\vec{a}\| = 3$, $\left\|\vec{b}\right\| = 2$, and the angle between $\vec{a}$ and $\vec{b}$ is $\dfrac{4\pi}{3}$.

   (b) if $\vec{a} = \langle 2, -3 \rangle$ and $\vec{b} = 4\mathbf{i} + 5\mathbf{j}$.

2. Find the value(s) of x such that the vectors $\vec{u} = \langle 2x, -x \rangle$ and $\vec{v} = \langle 3, x \rangle$ are orthogonal.

3. Find the value(s) of x such that $\vec{s} = \langle 1, x \rangle$ and $\vec{t} = \langle 3, 4 \rangle$ are parallel.

4. Find the work done by a force of 30lb acting in the direction N30°W in moving an object 20ft West.

5. A 10lb block slide down a straight ramp for the initial point $(0, 15)$ to the final position $(7, 0)$.
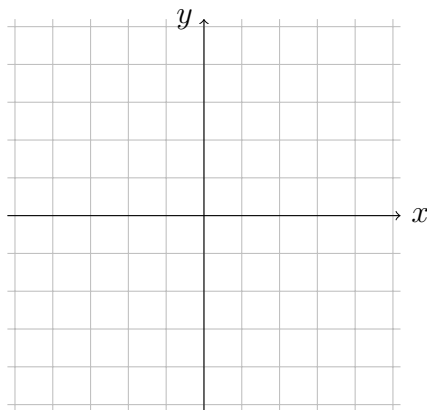
   Find the work done by the gravity force on the block.

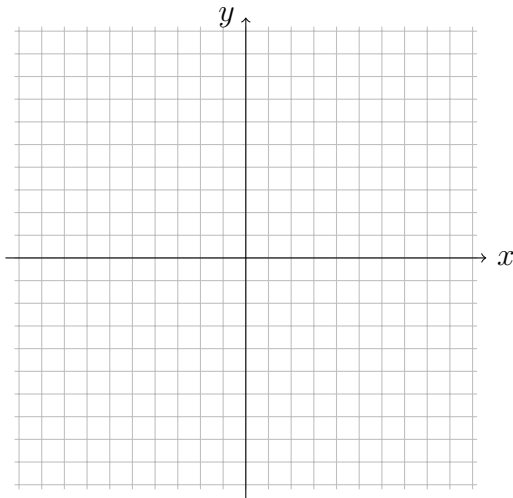6. Find the distance from the point $P(1, 3)$ to the line $y = 2x - 1$.
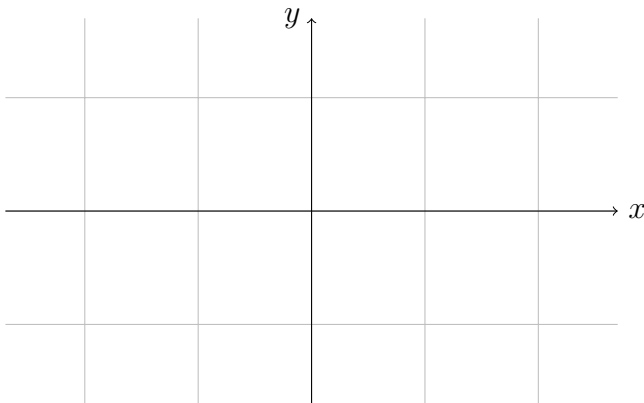
2   Section 1.3

1. For each parametric equation,

   - sketch the curve.
   - Eliminate the parameter to find a Cartesian equation.
   - $x(t) = t^2 - 4 \quad y(t) = 1 - t$.

- $x(t) = 2t - 7, \quad y(t) = t - 5.$

- $x(t) = 2\cos t \quad y(t) = \sin t.$

2. Find a vector equation, a parametric equation, and a Cartesian equation for

   (a) the line passing through the points $A(1, -2)$ and $B(3, 4)$.

   (b) the line passing through the point $C(1, 3)$, and parallel to the vector $\overrightarrow{v} = \langle 2, 5 \rangle$.

(c) the line passing through the point $D(-1, 2)$, and orthogonal to $\vec{w} = \langle 3, 5 \rangle$.

3. Are the lines

$$L_1 : \vec{r}_1(t) = \langle 4 + t, 1 + 2t \rangle \quad L_2 : \vec{r}_2(t) = \langle 5 - 4t, -2 + 2t \rangle$$

orthogonal, parallel or neither.

In case L_1 and L_2 are not parallel, find the coordinates of the intersection point of L_1 and L_2.

4. A marble is moving in the xy-plane. Its position at time t is given by

$$x(t) = 2t + 5 \quad y(t) = 8t - t^2.$$
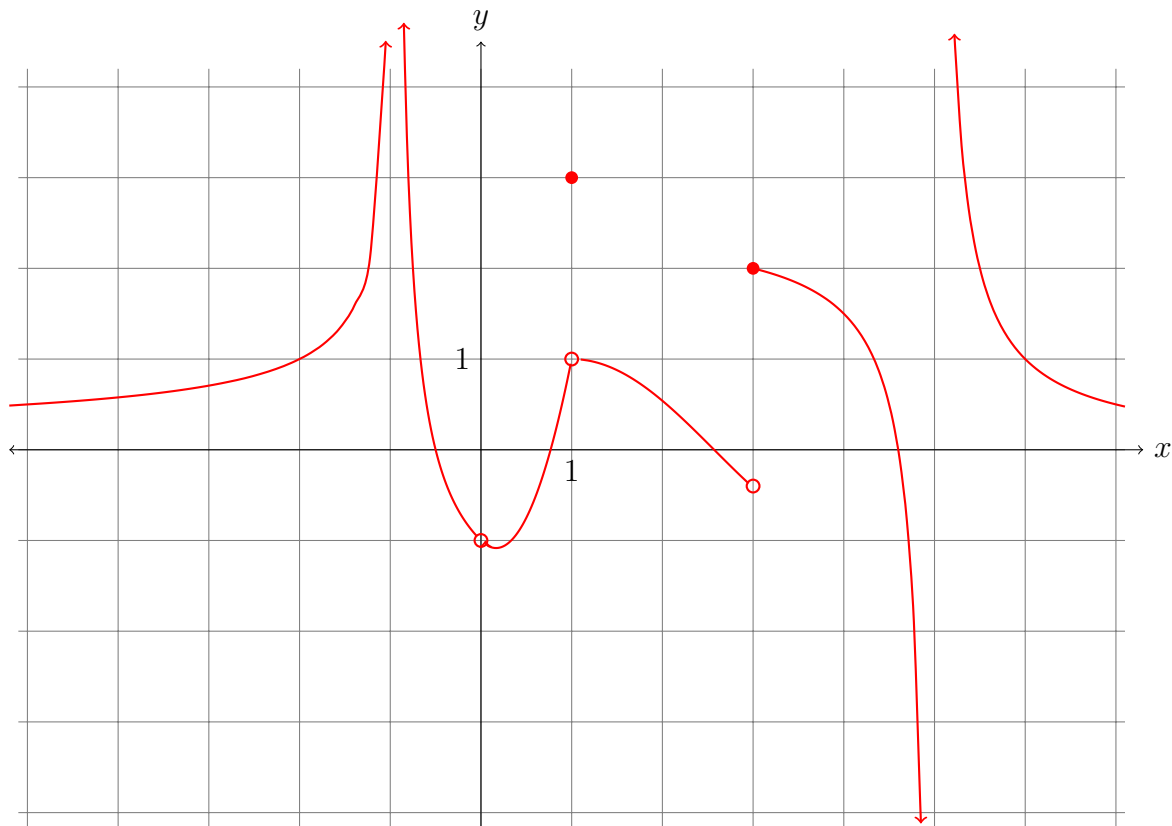
(a) Find the position of the marble at time $t = 3$.

(b) The line $y = 15$ is traced on the plane. At what time(s) does the marble cross the line?

(c) Does the marble pass through the point $(9, 12)$?

(d) Does the marble pass through the point $(7, 12)$?

3   Section 2.2

1. Given the function f defined by its graph,

(a) What is the domain of f?

(b) Complete the following equalities:

$$\lim_{x \to -1^-} f(x) = \qquad \lim_{x \to -1^+} f(x) = \qquad \lim_{x \to -1} f(x) = \qquad f(-1) =$$

$$\lim_{x \to 0^-} f(x) = \qquad \lim_{x \to 0^+} f(x) = \qquad \lim_{x \to 0} f(x) = \qquad f(0) =$$

$$\lim_{x \to 1^-} f(x) = \qquad \lim_{x \to 1^+} f(x) = \qquad \lim_{x \to 1} f(x) = \qquad f(1) =$$

$$\lim_{x \to 3^-} f(x) = \qquad \lim_{x \to 3^+} f(x) = \qquad \lim_{x \to 3} f(x) = \qquad f(3) =$$

$$\lim_{x \to 5^-} f(x) = \qquad \lim_{x \to 5^+} f(x) = \qquad \lim_{x \to 5} f(x) = \qquad f(5) =$$

2. Find the asymptotes and holes of the function $f(x) = \dfrac{x - 1}{x^2 - 3x + 2}$.