3

7

1. Find the average rate of change of  $y = \sqrt{2x-1}$  between x = 1 and x = 5.

Solution. The average rate of change of y = f(x) between x = a and x = b is

$$\frac{f(b) - f(a)}{b - a}$$

and so we have

$$\frac{\sqrt{2\cdot 5-1}-\sqrt{2\cdot 1-1}}{5-1}=\frac{\sqrt{9}-\sqrt{1}}{4}=\frac{2}{4}=\frac{1}{2}.$$

So the average rate of change is 1/2.

2. Sketch the graph of  $y = \frac{1-2x}{5x-20}$  including x and y intercepts and horizontal and vertical asymptotes.

Solution. First, we observe that 5x - 20 = 0 exactly when x = 4, and when x = 4, the numerator, 1 - 2x, is  $-7 \neq 0$ , so there is a vertical asymptote at x = 4. Next,

$$\lim_{x \to \infty} \frac{1 - 2x}{5x - 20} = \lim_{x \to \infty} \frac{1/x - 2}{5 - 20/x} = \frac{-2}{5}$$

so there is one horizontal asymptote, at y = -2/5.

To find the y-intercept, we let x = 0, to get y = 1/-20 and to find the x-intercept, we set y = 0, that is, solve

$$0 = \frac{1 - 2x}{5x - 20}, \qquad 0 = 1 - 2x, \qquad 2x = 1,$$

which gives x = 1/2.

