Exercise 3

For the function f whose graph is given, state the following.

(a) $\lim\limits_{x \to \infty} f(x)$

(b) $\lim\limits_{x \to -\infty} f(x)$

(c) $\lim\limits_{x \to 1} f(x)$

(d) $\lim\limits_{x \to 3} f(x)$

(e) The equations of the asymptotes

Solution

Use the given graph to evaluate the limits. Note that the limits in which $x \to \pm\infty$ give the horizontal asymptotes if they are finite.

(a) $\lim\limits_{x \to \infty} f(x) = -2$

(b) $\lim\limits_{x \to -\infty} f(x) = 2$

(c) $\lim\limits_{x \to 1} f(x) = \infty$

(d) $\lim\limits_{x \to 3} f(x) = -\infty$

The horizontal asymptotes are $y = 2$ and $y = -2$, and the vertical asymptotes are $x = 1$ and $x = 3$.