SOLUTIONS

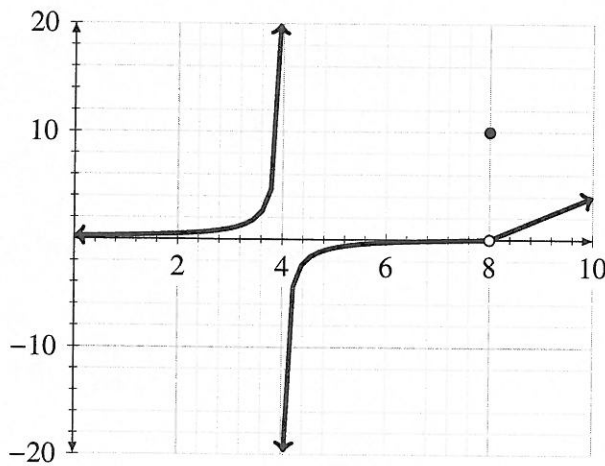**1.** The function $g(x)$ is graphed below. Use the graph to fill in the blanks.

a) $\lim\limits_{x \to 4^-} g(x) =$ $+\infty$

b) $\lim\limits_{x \to 4^+} g(x) =$ $-\infty$

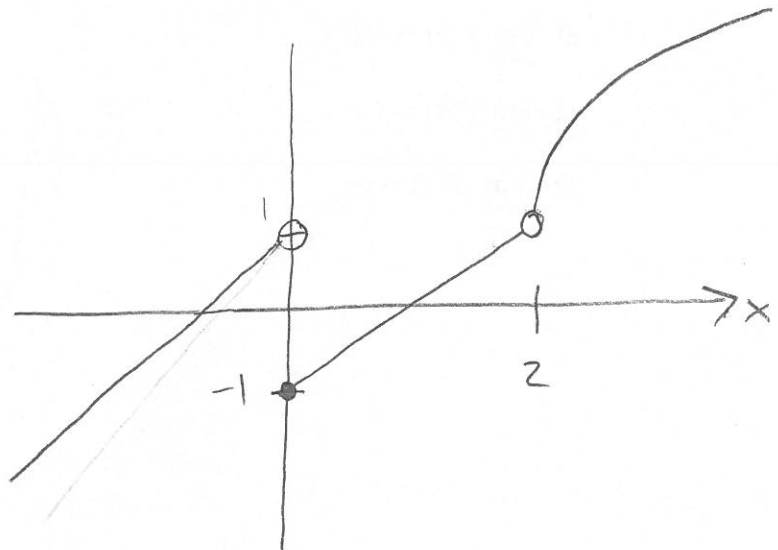c) $\lim\limits_{x \to 4} g(x) =$ $d.n.e.$

d) $g(4) =$ $d.n.e.$

e) $\lim\limits_{x \to 8} g(x) =$ 0

f) $g(8) =$ 10

Write the equation of any vertical asymptotes:

$$x = 4$$

2. Graph the function and then evaluate the limits: $f(x) = \begin{cases} x + 1 & x < 0 \\ x - 1 & 0 \le x < 2 \\ 1 + \sqrt{x - 2} & 2 < x \end{cases}$

a) $\lim\limits_{x \to 0} f(x)$ $d.n.e.$

b) $\lim\limits_{x \to 2} f(x) = 1$

c) For which values a does $\lim_{x \to a} f(x)$ exist?

$\lim\limits_{x \to a} f(x)$ except for $a = 0$

3. Without using a calculator, determine the (infinite) limit. Explain your reasoning.

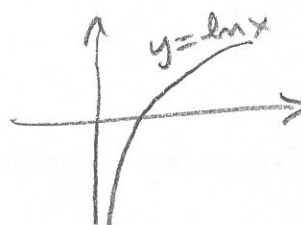a) $\lim\limits_{x \to 3^+} \dfrac{\sqrt{x}}{x-3} = +\infty$

numerator is positive,
denominator is positive
and small

b) $\lim\limits_{x \to 3^+} \dfrac{2-10x}{\sin(x-3)} = -\infty$

numerator is negative,
denominator is positive
and small

c) $\lim\limits_{x \to 3^+} \ln(x-3) = -\infty$

shift right
by 3

4. Sketch the graph of a function f that satisfies *all* of the given conditions. (*Answers will vary.*)

a) $f(0) = 2$

b) $f(3) = 1$

c) $\lim\limits_{x \to 0} f(x) = 1$

d) $\lim\limits_{x \to 3^-} f(x) = -2$

e) $\lim\limits_{x \to 3^+} f(x) = 4$

f) $\lim\limits_{x \to -1^+} f(x) = \infty$