1D. Limits and continuity

1a)

$$\lim_{x \to 0} \frac{4}{x-1} = -4$$

1c)

$$\lim_{x \to -2^-} \frac{4x^2}{x+2} = -\infty$$

$$\lim_{x \to -2^+} \frac{4x^2}{x+2} = \infty$$

1d)

$$\lim_{x \to 2^+} \frac{4x^2}{2-x} = -\infty$$

1f)

$$\lim_{x \to \infty} \frac{4x^2}{x-2} = \infty$$

1g)

$$\lim_{x \to \infty} \frac{4x^2}{x-2} - 4x = 8$$

3a)

infinite discontinuity at $x = -2$ (vertical asymptote)

removable discontinuity at $x = 2$ (hole)

3c)

removable discontinuity at $x = 0$ (hole)

3d)

removable discontinuity at $x = 0$ (hole)

3e)

jump discontinuity at $x = 0$

6a)

$$f(x) = \begin{cases} g(x), & x \geq 0 \\ h(x), & x < 0 \end{cases} \Rightarrow \quad g'(0) = 4$$

$a = 4$

$b = 1$

8a)

$$f(x) = \begin{cases} g(x), & x > 0 \\ h(x), & x \leq 0 \end{cases} \Rightarrow \quad \begin{matrix} h(0) = 0 \\ h'(0) = 2 \end{matrix}$$

$a =$ any real number that isn't 2

$b = 0$