1. The graph of functions $f$ and $g$ are given below. Evaluate the following quantities.

(a) \( \lim_{x \to 2} g(x) \)  
(b) \( g(2) \)  
(c) \( \lim_{x \to 2} \frac{f(x)}{g(x)} \)  
(d) \( \lim_{x \to 1} \frac{f(x)}{g(x)} \)  
(e) \( \lim_{x \to -1} \frac{f(x)}{g(x)} \)  
(f) \( \lim_{x \to -2} \frac{f(x)}{g(x)} \)
2. The graph of a function $g(x)$ is given below. Evaluate the following limits. If a limit does not exist because the one-sided limits differ, evaluate both one-sided limits.

(a) \[ \lim_{h \to 0} \frac{g(-2 + h) - g(-2)}{h} \]
(b) \[ \lim_{x \to 0} \frac{g(x) - g(0)}{x} \]

(c) \[ \lim_{x \to 2} \frac{g(x) - g(2)}{x - 2} \]
(d) \[ \lim_{x \to 3} \frac{g(x) - g(3)}{x - 3} \]

3. Sketch the graph of the relevant function, and use it to find the specified limit.

(a) \[ \lim_{x \to 2^+} \left(3 - \frac{4}{x - 2}\right) \]  
(b) \[ \lim_{x \to 2^-} \left(3 - \frac{4}{x - 2}\right) \]  
(c) \[ \lim_{x \to \infty} \left(3 - \frac{4}{x - 2}\right) \]
Working with Limits – Solutions

1. (a) 2
   (b) 1
   (c) $-\frac{1}{2}$
   (d) $-1$
   (e) Does not exist.
   (f) $\frac{1}{2}$

2. (a) $\frac{1}{2}$
   (b) $-\frac{3}{2}$
   (c) Does not exist.
   (d) Does not exist.

3. (a) Does not exist ($-\infty$)
   (b) Does not exist ($\infty$)
   (c) 3