AB Calculus Intro to Limits Homework **Name:** _____

1. Using words, explain what is meant by the mathematical expression $\lim_{x \to c} f(x) = K$

2. Use a graph and complete the table to investigate the value of the following limits. (Calculator)

a) $\lim_{x \to 1} \frac{x^2 - 4}{x - 1}$

x				1			
$f(x)$							

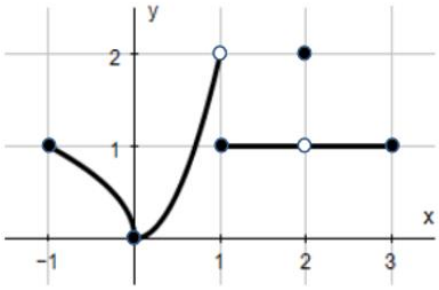
b) $\lim_{x \to -3} \frac{x^2 + 4x + 3}{x^2 - 3}$

x				-3			
$f(x)$							

c) $\lim_{x \to 2} \frac{x^3 - 8}{x - 2}$

x				2			
$f(x)$							

3. Determine whether each statement about the graph of $f(x)$ below is True or False.



a) $\lim_{x \to -1^+} f(x) = 1$

b) $\lim_{x \to 2} f(x) = DNE$

c) $\lim_{x \to 2} f(x) = 2$

d) $\lim_{x \to 1^-} f(x) = 2$

e) $\lim_{x \to c} f(x)$ exists at every c in the interval $(-1, 1)$

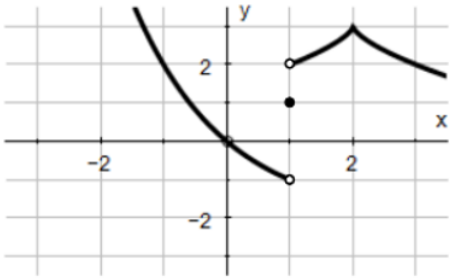
f) $\lim_{x \to 1^+} f(x) = 1$

g) $\lim_{x \to 1} f(x) = DNE$

h) $\lim_{x \to 0^+} f(x) = \lim_{x \to 0^-} f(x)$

i) $\lim_{x \to c} f(x)$ exists at every c in the interval $(1, 3)$

4. Use the graph of $f(x)$ to find the following.



a) $\lim_{x \to 1^+} f(x)$

b) $\lim_{x \to 1^-} f(x)$

c) $\lim_{x \to 1} f(x)$

d) $f(1)$

e) $\lim_{x \to 2^+} f(x)$

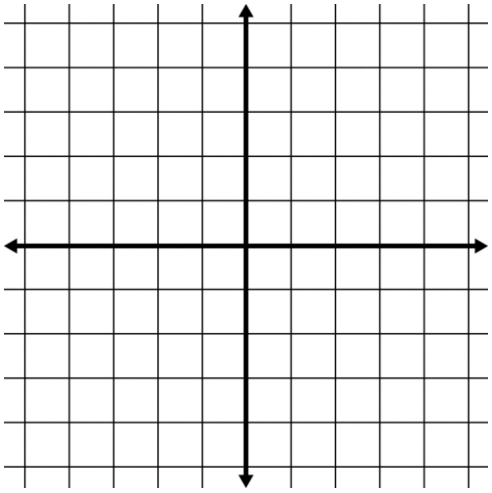
f) $\lim_{x \to 2^-} f(x)$

g) $\lim_{x \to 2} f(x)$

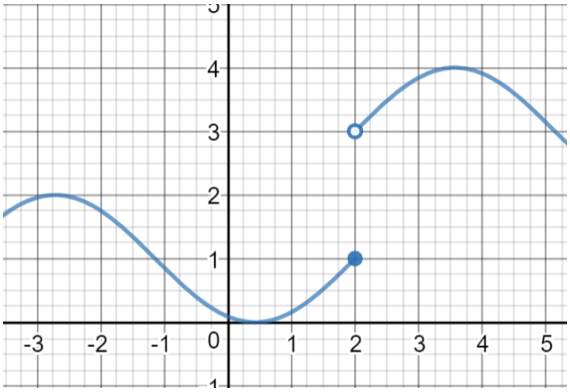
h) $f(2)$

5. For the following function, draw the graph on the grid provided, and find $\lim_{x\to 2^+} f(x)$, $\lim_{x\to 2^-} f(x)$, and $\lim_{x\to 2} f(x)$ or explain why it does not exist.

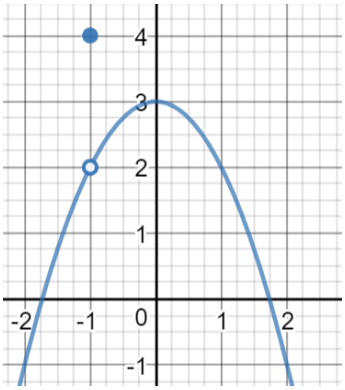
$$f(x) = \begin{cases} 6 - x, & x < 2 \\ 4, & x = 2 \\ \frac{x}{2} + 3, & x > 2 \end{cases}$$



6. The graphs of $g(x)$ and $f(x)$ are below. Find $\lim_{x\to -1} g(f(x))$



Graph of $g(x)$



Graph of $f(x)$

7. Given that $\lim_{x\to c} f(x) = 7$ and $\lim_{x\to c} g(x) = 4$, evaluate the following limits.

a) $\lim_{x\to c}[3g(x)]$

b) $\lim_{x\to c}[f(x)g(x)]$

c) $\lim_{x\to c}[g(x) - f(x)]$

d) $\lim_{x\to c} \frac{f(x)}{g(x)}$

8. Evaluate the following limits.

a) $\lim_{x\to 1}(x^3 + 3x^2 - 2x - 17)$

b) $\lim_{x\to -2}(x - 6)^{\frac{2}{3}}$

c) $\lim_{y\to 2} \frac{y^2 + 5y + 6}{y + 2}$

d) $\lim_{x\to -2} \sqrt{x - 2}$