Limits & Continuity
Chapter 1 Review

Find the following limits *without* using a graphing calculator or making tables.

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

#2) $\lim_{h\to 0} \frac{x^4 h - x h^2}{h}$

Answer each question concerning piecewise functions.

#3) $f(x) = \begin{cases} -x+4, & if\ x < 4 \\ x-5, & if\ x \geq 4 \end{cases}$

a. $\lim_{x\to 4^-} f(x) =$

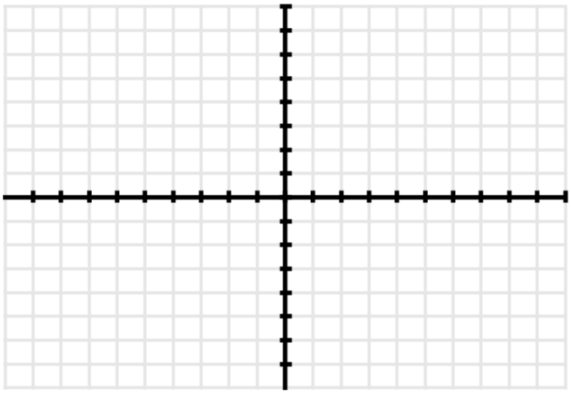
b. $\lim_{x\to 4^+} f(x) =$

c. $\lim_{x\to 4} f(x) =$

#4) For the following piecewise function:

$$f(x) = \begin{cases} \frac{1}{2}x + 3, & if\ x \leq 2 \\ -x + 6, & if\ x > 2 \end{cases}$$

a. Draw its graph

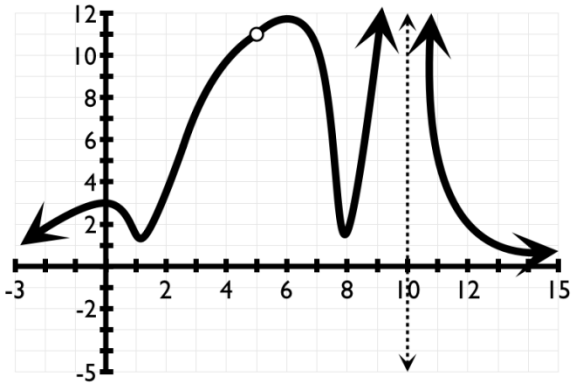


b. Find the limits as x approaches 2 from the left.

c. Find the limits as x approaches 2 from the right.

d. Is it continuous at x = 2? If not, why?

#5) Find each limit. Assume that each limit that does exist is an integer. (There is no work to be shown)



a. $\lim_{x\to 0^-} f(x) =$

b. $\lim_{x\to 0^+} f(x) =$

c. $\lim_{x\to 0} f(x) =$

d. $\lim_{x\to 5^-} f(x) =$

e. $\lim_{x\to 5^+} f(x) =$

f. $\lim_{x\to 5} f(x) =$

g. $\lim_{x\to 10^-} f(x) =$

h. $\lim_{x\to 10^+} f(x) =$

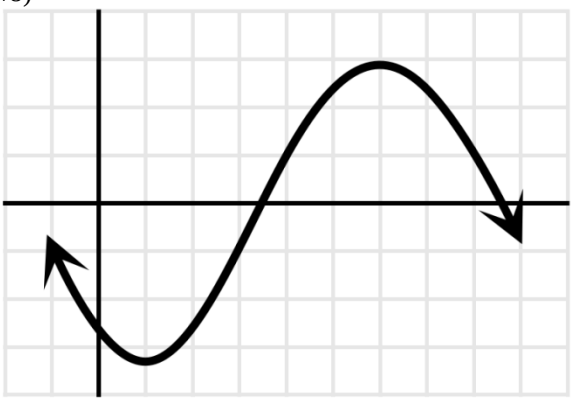
i. $\lim_{x\to 10} f(x) =$

#6) Find the equation for the tangent line to the curve $f(x) = \frac{1}{2}x^2$ at $x = 1$. Write your equation in slope-intercept form.

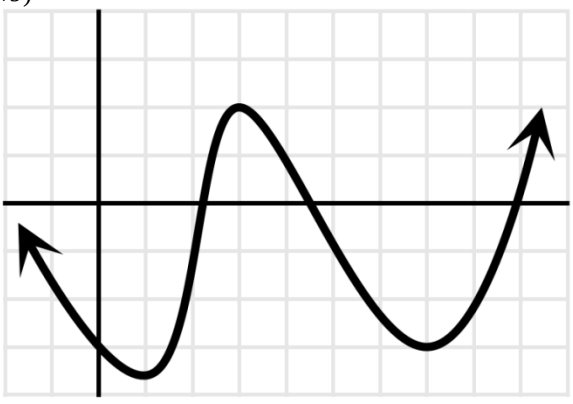
#7) Find the equation for the tangent line to the curve $f(x) = x^2 - 8x + 5$ at $x = 2$. Write your equation in slope-intercept form.

Given the graph of a function, sketch in the graph of its derivative function.

#8)



#9)



#10) Often times, problems will ask for the derivative without using the word "derivative". We have learned two interpretations of a derivative. What are these two interpretations?

#11) $\lim_{x\to 5}(x^2+1)=26$ is read "the limit of x^2+1, as x approaches 5, is 26." Use sentences and graphs to illustrate the meaning of said statement.

#12) Give 2 specific scenarios of when a limit would not exist and explain why. You *may* use graphs to illustrate your point.

Scenario #1:

Scenario #2: