Written Homework 1

Instructions

1. Before you begin this assignment be sure you are reading all notes and information in the lesson summary page and on the assignment page in WyoCourses.
2. Be sure you are complying with the formatting requirements in `M2200-98 ILSB Written Homework Requirements.pdf`. Solutions not started on these pages will not be graded!

Assignment Problems

1. Let $g(t) = \dfrac{t-9}{\sqrt{t}-3}$. Fill in the two tables below, one showing values of g for $t = 8.9,\ 8.99,\ 8.999$ and one for $t = 9.1,\ 9.01,\ 9.0001$. Then make a conjecture about the value of $\lim\limits_{t\to 9} \dfrac{t-9}{\sqrt{t}-3}$.

   Use 5 decimal places when recording your results.

t	8.9	8.99	8.999
$g(t)$			

t	9.1	9.01	9.001
$g(t)$			

Conjecture:

2. Use the graph of f in Figure 1 to find the following values or state that they do not exist. Note that parts (d), (h), and (l) require additional justification (indicated in spaces below).

(a) $f(1) =$ _____

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

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

(d) $\lim_{x\to 1} f(x) =$ _____

Reason:

_____

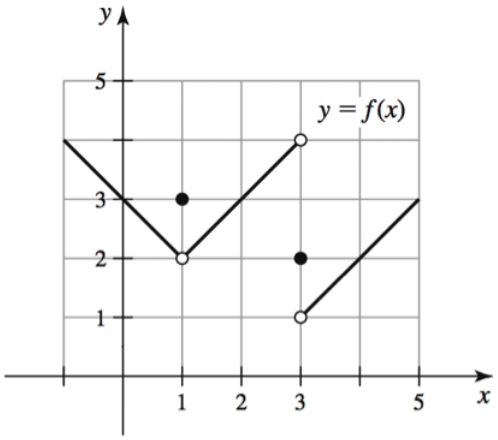

Figure 1: Graph of $f(x)$

(e) $f(3) =$ _____

(f) $\lim_{x\to 3^-} f(x) =$ _____

(g) $\lim_{x\to 3^+} f(x) =$ _____

(h) $\lim_{x\to 3} f(x) =$ _____

Reason:

_____

(i) $f(2) =$ _____

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

(k) $\lim_{x\to 2^+} f(x) =$ _____

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

Reason:

_____

3. Let

$$f(x) = \begin{cases} 0, & \text{if } x \leq -5 \\ \sqrt{25 - x^2}, & \text{if } -5 < x < 5 \\ 3x, & \text{if } x \geq 5 \end{cases}$$

Evaluate the following limits or state why they do not exist. You must show ALL work to receive full credit. If limits do not exist you must have a clear statement using proper mathematical notation.

(a) $\lim_{x \to -5^-} f(x)$

(b) $\lim_{x \to -5^+} f(x)$

(c) $\lim_{x \to -5} f(x)$

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

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

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

For problems 4 through 9: Evaluate the following limits *analytically*. Results using numerical evaluation (i.e. using a table) or a graphical justification (i.e. using a graph) will receive NO credit.

4. $\lim_{x \to 4} \dfrac{x^2 - 16}{4 - x}$

5. $\lim_{t \to 2} \dfrac{3t^2 - 7t + 2}{2 - t}$

6. $\lim_{h \to 0} \dfrac{\frac{1}{5+h} - \frac{1}{5}}{h}$

7. $\lim_{x \to 3} (2x + |x - 3|)$

8. $\lim_{h \to 0} \dfrac{\sqrt{16+h}-4}{h}$

9. $\lim_{x \to 1} \dfrac{x - 1}{\sqrt{4x + 5} - 3}$

10. Use the information given by the graphs in Figure 2 to apply the Squeeze Theorem to determine

$$\lim_{x \to 0} x^2 \ln(x^2)$$

where

$$f(x) = |x|, \quad h(x) = -|x|, \quad g(x) = x^2 \ln(x^2)$$

Note: When using any theorem it is essential that you use words in your solution. Do not just describe what is happening in the graph! This will result in no credit.

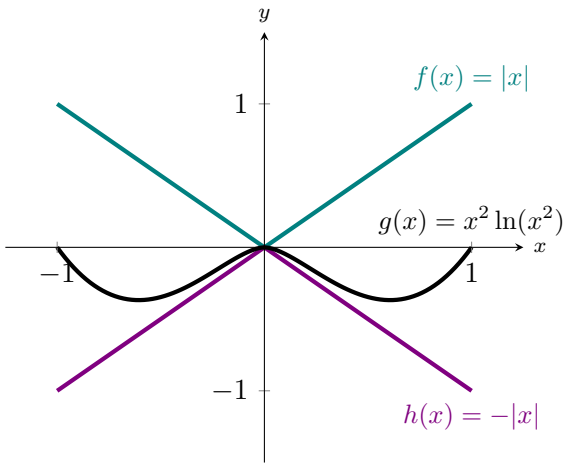

Figure 2: Graph of $f(x)$, $g(x)$, $h(x)$

Use the worksheet solutions for this lesson as a guide to the format your solution should follow.