

Calculus I - Math 124 Homework #1 - due Tuesday 4/8

• **Problems from the book:** (Feel free to work on more problems in these sections for extra practice.)

- §2.1: 1ab, 3, 5, 9
- §2.2: 1-5, 6i-1, 9, 13, 15, 20, 33, 25-32, 40 (For #25-32, try to reason out the limits w/o using graphs or tables.)
- §2.3: 1, 3, 4, 9-12, 17, 19, 21, 25, 39, 41, 43, 44

• **Additional Problems:**

1. Consider the function $f(x) = \frac{1}{1-2^{1/x}}$ for $x \neq 0$.

- (a) Find $\lim_{x \rightarrow 0^-} f(x)$. Justify your answer by considering the definition of the function. (Discuss what happens to the numerator and denominator of $f(x)$ as x approaches 0 from the left.)
- (b) Find $\lim_{x \rightarrow 0^+} f(x)$. Justify your answer by considering the definition of the function.
- (c) Does $\lim_{x \rightarrow 0} f(x)$ exist?

2. Write equations for the vertical asymptotes of the function $y = \frac{x^2+6x+9}{x^3+11x^2+24x}$.

3. Evaluate the following limits using limit laws (not graphs or tables). If the limit does not exist, explain why.

(a) $\lim_{x \rightarrow 2} \frac{x^3 + 2x^2 - 8x}{x^2 - 4}$

For parts (d) & (e), $h(x) = \begin{cases} x + 5 & \text{if } x \leq 3 \\ x^2 - 6 & \text{if } x > 3 \end{cases}$

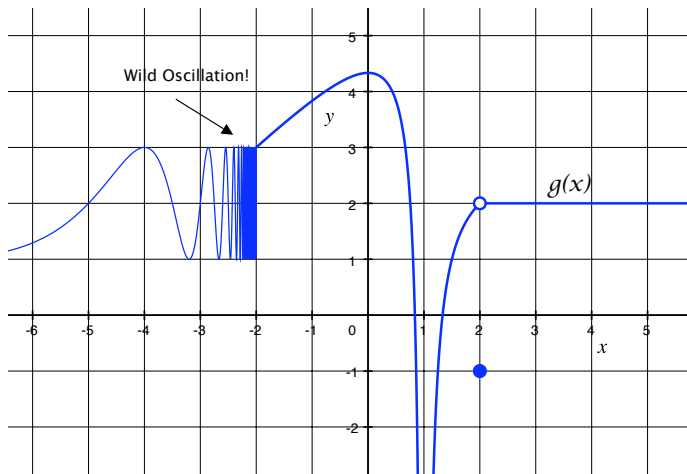
(b) $\lim_{m \rightarrow 1} \frac{m^2 + 6m - 7}{m^2 + 9}$

(d) $\lim_{x \rightarrow 2.5} h(x)$

(c) $\lim_{t \rightarrow 5^+} \frac{5 - t}{|5 - t|}$

(e) $\lim_{x \rightarrow 3} h(x)$

4. For the function $g(x)$ whose graph is below, state the value of each quantity, if it exists.



(a) $g(2)$ (f) $\lim_{x \rightarrow 1} g(x)$

(b) $\lim_{x \rightarrow 2^+} g(x)$ (g) $g(1)$

(c) $\lim_{x \rightarrow 2} g(x)$ (h) $\lim_{x \rightarrow -2^+} g(x)$

(d) $\lim_{x \rightarrow 1^+} g(x)$ (i) $\lim_{x \rightarrow -2^-} g(x)$

(e) $\lim_{x \rightarrow 1^-} g(x)$