Math 141 - Spring 2018
Practice Problems for Exam 1

On the exam, you must show all work to receive full credit. No calculators or other technology will be permitted.

1. Evaluate the given limit.
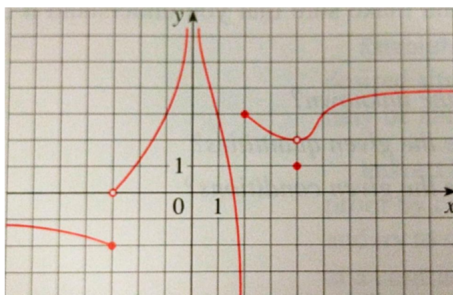
$$\lim_{x \to 4} \frac{2 - \sqrt{x}}{4x - x^2}$$

2. Evaluate the given limit.

$$\lim_{x \to \frac{\pi}{2}} \sin(x + \cos x)$$

3. Evaluate the given limit.
$$\lim_{x \to -3} \frac{x^2 + 3x}{x^2 - x - 12}$$

4. Does the function graphed below have any discontinuities? If so, where?

5. Consider the function

$$f(x) = \begin{cases} \sqrt{-x} & x < 0 \\ 3 - x & 0 \le x < 3 \\ (x-3)^2 & x \ge 3 \end{cases}$$

(a) Evaluate each limit, if it exists.

$\lim\limits_{x \to 0^-} f(x)$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $\lim\limits_{x \to 3^-} f(x)$

$\lim\limits_{x \to 0^+} f(x)$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $\lim\limits_{x \to 3^+} f(x)$

$\lim\limits_{x \to 0} f(x)$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $\lim\limits_{x \to 3} f(x)$

(b) Use interval notation to state where $f(x)$ is **continuous**.

6. Evaluate the different quotient $\dfrac{f(x+h) - f(x)}{h}$ for $f(x) = x^2 - 3x + 1$. Simply your answer.

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7. Evaluate the following limits

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

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

$$\lim_{x \to -3} \frac{x+2}{x+3}$$
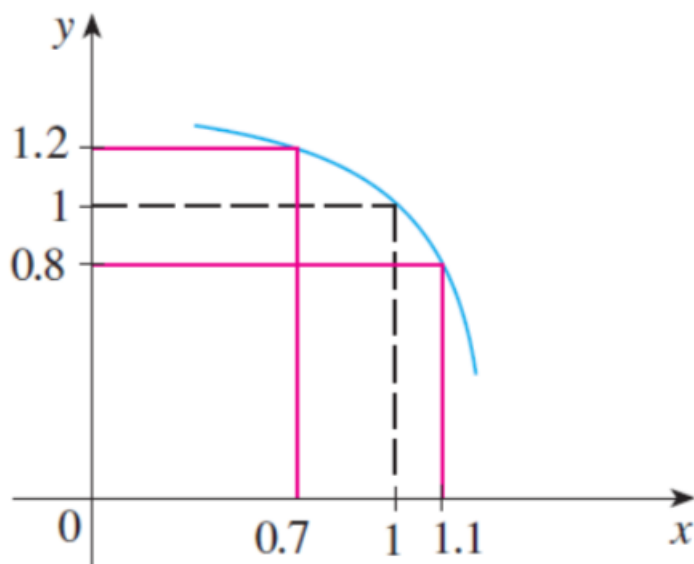
8. $\lim_{x \to 5} f(x) = 2$ and $\lim_{x \to 5} g(x) = 1$ evaluate the following.

(a) $\lim_{x \to 5} [3f(x) - 5g(x)]$

(b) $\lim_{x \to 5} \frac{f(x)}{g(x)}$

(c) $\lim_{x \to 5} [f(x)^4 + g(x)]$

9. Use the given graph of f to find a number δ such that if $|x - 1| < \delta$ then $|f(x) - 1| < 0.2$.

10. Suppose f and g are continuous functions such that $g(1) = 4$ and $\lim_{x \to 1} [2f(x) + f(x)g(x)] = -24$. Find $f(1)$.

11. Write out the proper mathematical notation associated with the sentence below.

"The limit of $f(x)$ as x approaches 2 is equal to 10."

12. True or False.
Review limit laws, properties of continuous functions, how a function can fail to be differentiable, and any theorems we discussed.