Minitest 1 Review Answers, Calculus I

Dr. Graham-Squire, Fall 2017

1. Calculate the limit, if it exists. If it does not exist, explain why.

   (a) $\lim_{x\to 7} \dfrac{\left(\dfrac{1}{2} - \dfrac{1}{x-5}\right)}{x-7}$.

   Ans: 1/4

   (b) $\lim_{x\to 4^-} \dfrac{4-x}{16-8x+x^2}$

   Ans: Limit does not exist, goes to positive ∞.

   (c) $\lim_{x\to\infty} \dfrac{2x^8-4x}{7x^8+4}$

   Ans: 2/7

2. True or False: If true, explain why it is true, if false give a counterexample or explain why it is false.

   (i) If $x = 2$ is a vertical asymptote of $y = f(x)$, then $\lim_{x\to 2^+} f(x) = \infty$.

   Ans: False, the limit could also be negative infinity, or you could have the limit from the right exist and the limit from the left be equal to positive or negative infinity.

   (ii)

$$\lim_{x\to 1} \frac{x^2+6x-7}{x^2+5x-6} = \frac{\lim_{x\to 1} x^2+6x-7}{\lim_{x\to 1} x^2+5x-6} = \frac{0}{0} = DNE$$

   Ans: False, you can factor and cancel the original expression and find that the limit is equal to 8/7.

3. Use the definition of continuity to explain what values of k and j will make the function continuous at $x = -3$:

$$f(x) = \begin{cases} k & \text{if } x < -3 \\ x^2 + j & \text{if } x = -3 \\ \dfrac{2x^2+x-15}{x^2+4x+3} & \text{if } x > -3 \end{cases}$$

   Ans: $j = -3.5$ and $k = 5.5$

4. Use the limit definition of the derivative to calculate $f'(x)$ if $f(x) = (\sqrt{x-7})$, then calculate $f'(11)$.

   Ans: $f'(x) = \frac{1}{2\sqrt{x-7}}$ and $f'(11) = 1/4$

5. (a) Find a value for c such that the limit exists:

$$\lim_{x\to 3} \frac{x^2 - 7x + c}{x - 3}$$

Ans: $c = 12$. You need to have $c = 12$ in order to be able to factor the top and cancel with the bottom (it is also the only thing that will give you 0/0 when you plug in x=3).

(b) For that value of c, what is the limit?

Ans: The limit will be -1.