Math 201 Quiz 6B

October 2, 2019

Name: _____

Instructions: No calculators. Use your own scrap. Write your fully simplified answers in the space provided.

1. Suppose $f(x) = \frac{3x}{x-2}$. Note that $f(-1) > 0$ and $f(1) < 0$. As $f(1) < 0 < f(-1)$ are we guaranteed to have a root in the interval $(-1,1)$? If yes, say so and state what theorem you used. If no, state so and say why. (Recall, a root is a value c such that $f(c) = 0$.)

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2. For the Intermediate Value Theorem to apply to a function $f(x)$ on the interval $[a, b]$, what assumption(s) must be made about $f(x)$?

   _____

3. State the ϵ-δ definition of what $\lim_{x \to a} f(x) = L$ means: _____

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4. Use the ϵ-δ definition to prove $\lim_{x \to 2}(2x - 1) = 3$.

5. Using an equation, state the definition of the derivative of a function $f(x)$, assuming it exists.

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6. (a) Use limits to compute the derivative of $f(x) = 2 + \frac{1}{x}$. (Show your work below.)

   (b) Hence, state the equation of the tangent line to $f(x)$ at the point where $x = 1$. _____

Bonus:

1. State the chain rule: _____

2. Complete the rules:
   (a) $\frac{d}{dx}(cf(x)) =$ _____ (b) $\frac{d}{dx}(f(x) - g(x)) =$ _____