

# Math 201 Quiz 6A

October 2, 2019

Name: \_\_\_\_\_

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

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

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2. Suppose  $f(x) = \frac{3}{x-2}$ . Note that  $f(-3) < 0$  and  $f(3) > 0$ . As  $f(-3) < 0 < f(3)$  are we guaranteed to have a root in the interval  $(-3, 3)$ ? 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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3. State the  $\epsilon$ - $\delta$  definition of what  $\lim_{x \rightarrow a} f(x) = L$  means: \_\_\_\_\_

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4. Use the  $\epsilon$ - $\delta$  definition to prove  $\lim_{x \rightarrow 3} (3x - 2) = 7$ .

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  $f(x) = 3 - \frac{1}{x}$ . (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)  $\frac{d}{dx}(f(x) + g(x)) =$  \_\_\_\_\_ (b)  $\frac{d}{dx}(cf(x)) =$  \_\_\_\_\_