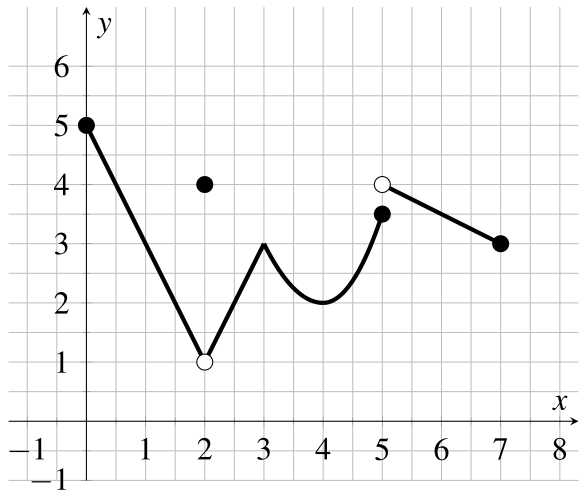
Math 251: Quiz 7 SOLUTIONS **March 26, 2019**

Name: ________________ ________ **/ 25**

Circle one: **Rhodes (F01)** | **Bueler (F02)**

25 points possible. No aids (book, calculator, etc.) are permitted. You need not simplify, but show all work and use proper notation for full credit.

1. [4 points] Use the graph to state all the <u>absolute</u> and <u>local</u> maximum and minimum values of the function.



abs. max. @ $x=0$

<u>no</u> abs. min.

loc. max. @ $x=2,3$

loc. min. @ $x=4$

2. [7 points] Find the absolute maximum and absolute minimum values of f on the given interval.

$$f(x) = 1 + 24x - 2x^3, \quad [0,3]$$

$f'(x) = 24 - 6x^2$

$x^2 = 4$

$x = \pm 2$

-2 is not in $[0,3]$

x	$f(x)$
0	1
+2	33
3	19

abs. max @ $x=2$

abs. min @ $x=0$

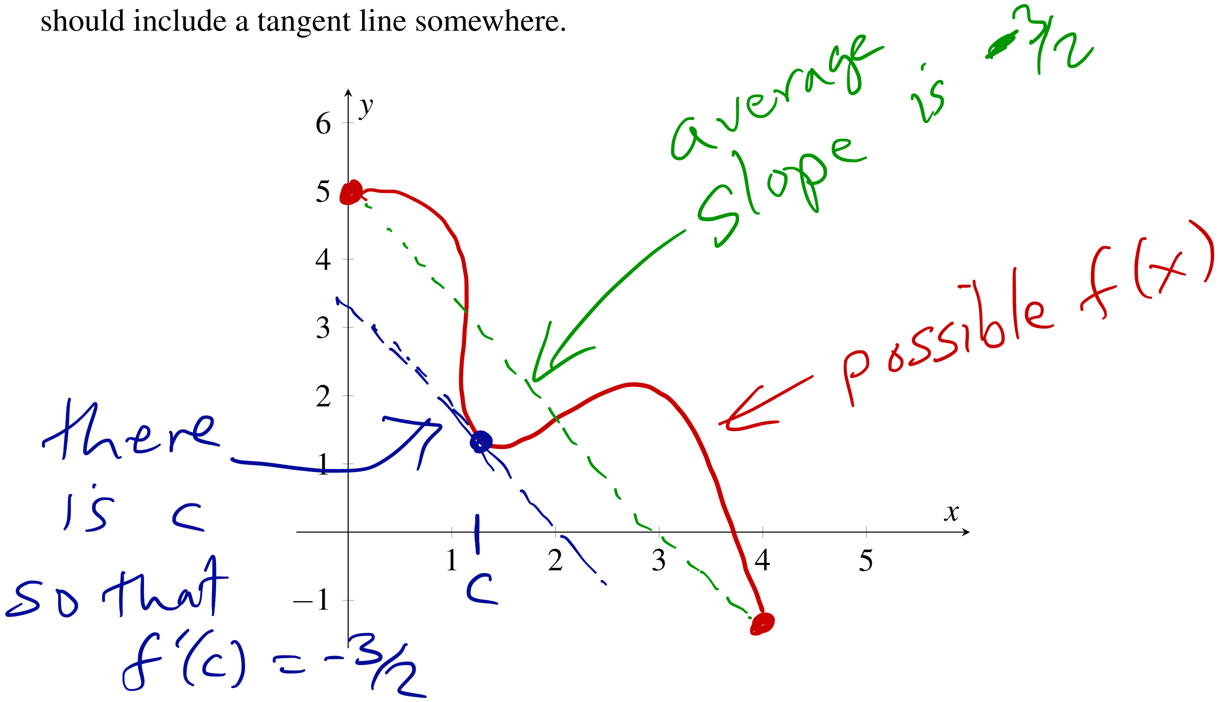
3. **[8 points]** Suppose f is continuous on $[0,4]$ and has a derivative at each point in $(0,4)$. Suppose $f(0) = 5$ and $f(4) = -1$.

a. What specifically does the Mean Value Theorem let you conclude?

there is c in [0,4] so that

$$f'(c) = \frac{-1-5}{4-0} = \frac{-6}{4} = \frac{-3}{2}$$

b. Draw a diagram that illustrates the Mean Value Theorem for this problem. Your illustration should include a tangent line somewhere.



4. **[6 points]** Find the critical numbers (critical points) of the function.

$g(t) = t^2 e^{-3t}$

$$g'(t) = 2t \cdot e^{-3t} + t^2 e^{-3t}(-3)$$

$$= e^{-3t}(2t - 3t^2) = e^{-3t} \cdot t \cdot (2-3t)$$

$g'(t) = 0 \iff t = 0$

or

$2 - 3t = 0 \iff t = \frac{2}{3}$