Circle your Instructor:
Faudree, Williams, Zirbes

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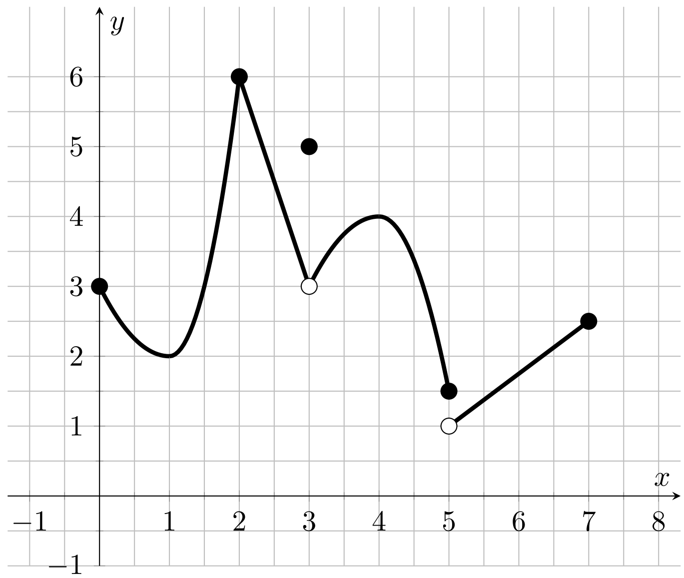
Math 251 Fall 2017 **Quiz #8, November 1st**

Name: ______________________________

There are 23 points possible on this quiz. This is a closed book quiz. Calculators and notes are not allowed. **Please show all of your work!** If you have any questions, please raise your hand.

Exercise 1. (8 pts.) Consider the graph of the function f given below.



a) State the absolute maximum of the function f on the interval $[0, 6]$ and give its location or explain why it doesn't exist.

Max. of 6 at $x = 2$.

b) State the absolute minimum of the function f on the interval $[0, 6]$ and give its location or explain why it doesn't exist.

None, the graph approache 1, but doesn't reach it.

c) Identify any other local maxima of the function f and their locations.

3 at 0, 5 at 3, 4 at 4 and 2.5 at 7.

d) Identify any other local minima of the function f and their locations.

2 at $x = 1$.

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Exercise 2. (5 pts.) Find the absolute maximum and absolute minimum of the function

$$f(x) = -2x^3 - 3x^2 + 12x$$

on the interval $[0, 3]$.

$f'(x) = -6x^2 - 6x + 12 = -6(x^2+x-2) = -6(x+2)(x-1)$.

Critical point in interval at $x=1$.

$f(0) = 0$

$f(1) = -2-3+12 = 7$

$f(3) = -54 - 27 + 36 = -54+9 = -45$

so 7 is the Absolute maximum and -45 is the absolute minimum.

Exercise 3. (5 pts.) Find the critical numbers of the function $F(x) = x^{4/5}(x-2)$.

$F(x) = x^{9/5} - 2x^{4/5}$

$F'(x) = \frac{9}{5}x^{4/5} - \frac{8}{5}x^{-1/5} = \frac{x^{-1/5}}{5}(9x-8)$

so critical points at $x=0$ and $x = \frac{8}{9}$.

Exercise 4. (5 pts.) Consider the function $f(x) = 3x^2 - 4x + 1$ on the interval $[0, 2]$.

a) Verify that the function satisfies the hypotheses of the Mean Value Theorem on the interval $[0, 2]$. Justify your answer in words.

$f(x)$ is a polynomial, so it is continuous and differentiable on $[0,2]$

b) Find all numbers c in the interval $[0, 2]$ that satisfy the conclusion of the Mean Value Theorem.

$$m = \frac{f(2) - f(0)}{2} = \frac{(12-8+1)-1}{2} = \frac{4}{2} = 2$$

$$f'(x) = 6x - 4$$

$$6x - 4 = 2$$
$$6x = 6$$
$$x = 1$$

so $c = 1$.