

PROBLEM SET VI

CALCULUS I \diamond MAT 181-050 \diamond FALL 2018

October 30, 2018

DUE: TUESDAY, NOVEMBER 6, 2018

READ: SECTIONS 4.2-4.4, 4.6

INSTRUCTIONS: All solutions should be prepared carefully, recopied in a neat final form, and presented in the order given. All solution sets shall be completed on white paper and stapled (unlined paper is preferred). Careless presentation (e.g. notebook fringes, bad handwriting, pen scribbles, doodles, wasted space, etc) will result in a deduction of points at my discretion. Submitted work that does not demonstrate clearly the process by which one arrived at the answer will not receive credit of any kind. Academic dishonesty will not be tolerated.

Name:

Score:

- 1.] Find the domain of the function below and use the first derivative test to determine the local extrema on the function's domain.

$$f(x) = e^x(x^2 - x - 1)$$

- 2.] Use the Closed Interval Method to determine the absolute extrema of the function $f(x) = 2x^3 + 3x^2 - 12x + 1$ on the interval $[-2, 4]$.

- 3.] Let $f(x) = 2x^3 + 3x^2 - 36x$.

- a.) Determine the x and y intercepts of this function.
 - b.) Determine the intervals where $f(x)$ is increasing and decreasing.
 - c.) Determine the intervals where $f(x)$ is concave up and concave down.
 - d.) Determine all local extreme points and inflection points.
 - e.) Give a sketch (on the graph paper provided) of $y = f(x)$ using the information you have obtained. Label all points of interest clearly.
- 4.] A farmer is to enclose a rectangular area so that the area is 200 ft^2 . The farmer will have to enclose three sides as there is already a fence on the fourth side. What dimensions should the rectangle be to use the least amount of fence? How much fence will be used?
- 5.] Determine whether the following function satisfies the hypotheses of Rolle's Theorem on the interval $[0, 2]$, then find the value $c \in (0, 2)$ algebraically.

$$f(x) = x^2 e^x - 2x e^x$$

- 6.] Determine whether the following function satisfies the hypotheses of the Mean Value Theorem on the interval $[0, 3]$, then find the value $c \in (0, 3)$ algebraically. (Be sure to confirm that c is in the correct interval by computing a decimal approximation.)

$$f(x) = 2^x$$

Graph paper for problem 3.

