MAT265 Homework 10

Due Date: April 08, 2016 Name: ____________________

Instructions: The following exercises are similar to those found in the course text book [related text book question are in brackets]. Show ALL your work and write neatly. This assignment is due at the beginning of the class period on the date above. Group work is allowed and encouraged, but each member must write up his/her own solutions. Submissions without staples, without a name, or without work shown *will not receive credit*.

1. [§4.2, # 10] Verify that $f(x) = x^3 - 3x + 2$ satisfies the hypotheses of the Mean Value Theorem on the interval $[-2, 2]$. Then find all numbers c that satisfy the conclusion of the Mean Value Theorem.

2. [§4.2, # 12] Verify that $f(x) = x^{2/3}$ satisfies the hypotheses of the Mean Value Theorem on the interval $[1, 8]$. Then find all numbers c that satisfy the conclusion of the Mean Value Theorem.

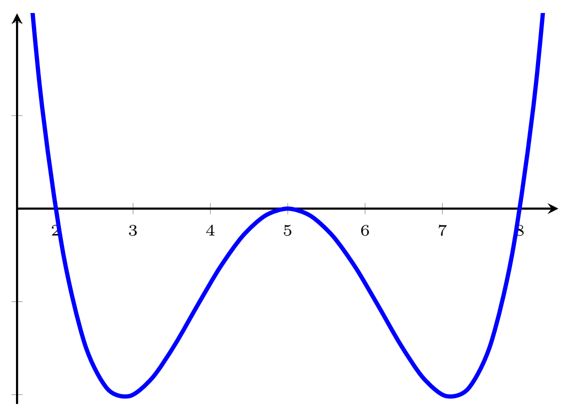
3. [§4.2, # 16] Let $f(x) = |x - 3|$. Show that there is no value of c such that

$$f(6) - f(0) = f'(c)(6 - 0).$$

Why does this not contradict the Mean Value Theorem?

4. [§4.2, # 24] Suppose that $-1 \le f'(x) \le 6$ for all real x. Show that $-8 \le f(8) - f(0) \le 48$.

5. [§4.3, # 15] Use the graph below to answer parts (a) - (c).

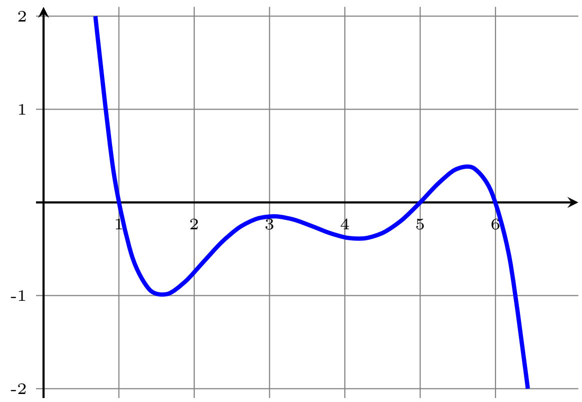


a. The curve is the graph of f. Estimate the x-coordinate of the inflection points of f.

b. The curve is the graph of f'. Estimate the x-coordinate of the inflection points of f.

c. The curve is the graph of f''. Estimate the x-coordinate of the inflection points of f.

6. [§4.3, # 24] The graph of the derivative f' of a continuous function f is shown below. Use it to answer parts (a)-(e).



a. On what intervals is f increasing or decreasing?

b. At what values of x does f have a local maximum or minimum?

c. On what intervals is f concave upward or concave downward?

d. Estimate the x-coordinate(s) of the point(s) of inflection.

e. Assuming that $f(0) = 0$, sketch a graph of f.

7. [§4.3, # 33] For $C(x) = x^{1/3}(x + 4)$,

a. Find the intervals of increase or decrease.

b. Find the local maximum and minimum values.

c. Find the intervals of concavity and the inflection points.

d. Use the information from parts (a) - (c) to sketch the graph. Check your work with a graphing calculator.

8. [§4.3, # 45] Suppose the derivative of a function f is $f'(x) = (x + 7)^2(x + 3)^3(x - 4)(x - 6)^4$. On what interval(s) is f increasing?