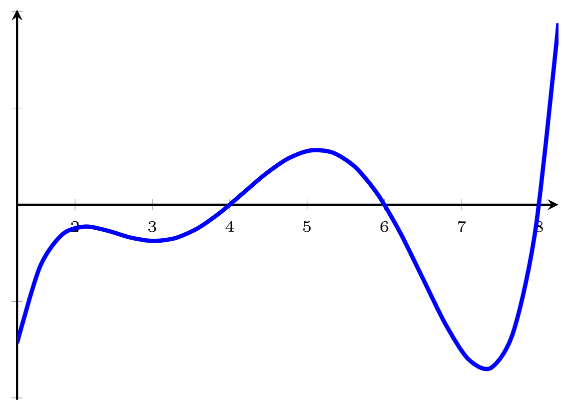
MAT265 Homework 11

Due Date: April 15, 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. [§4.3, # 16] The graph of the first derivative of a function f is shown below. Use this to answer parts (a) - (d).



a. On what intervals is f increasing? Explain.

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

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

d. What are the x-coordinate of the inflection points of f? Why?

2. [§4.3, # 26] For $f(x) = 36x + 3x^2 - 2x^3$,

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.

3. [§4.5, # 10] A box with an open top is to be constructed from a square piece of cardboard, measuring 4 feet wide, by cutting out a square from each of the four corners and bending up the sides.

a. Draw a diagram illustrating the situation, and label the diagram with symbols/variables.

b. Write an expression for the volume.

c. Use the given information to write an equation that relates the variables.

d. Use the previous part to write the volume as a function of one variable.

e. Using this function, find the largest volume that such a box can have.

4. [§4.5, # 14] A rectangular storage container with an open top is to have a volume of $15\,\mathrm{m}^3$. The length of its base is twice the width. Material for the base costs \$14 per square meter. Material for the sides costs \$7 per square meter. Find the cost of materials for the cheapest such container.

5. [§4.5, # 16] Find the point on the curve $y = x^4$ that is closest to the point $(0, 7)$.

6. [§4.5, # 28] A fence 10 ft tall runs parallel to a tall building at a distance at 5 ft from the building. What is the length of the shortest ladder that will reach from the ground over the fence to the wall of the building?