Review for Test 3: Sections 3.1 – 3.7, 3.9

Only scientific calculators will be allowed on the exam (no graphing calculators). The exam will be written in such a way that calculators will not be necessary; i.e., the calculations will be with simple numbers.

Assigned problems: Note: These problems are not meant to be a comprehensive list of problems or types of problems that will be on the exam. They are meant to give you practice with the skills from this chapter outside of the context of each section. Be sure to review your homework and notes as well in preparing for the test.

page 168: 1 – 25 eoo, 27 –71 eoo, 75 – 79 odd, 81, 85, 87, 95, 97cdf, 107

page 182: 1, 5, 9, 15

Concepts:

- Know and be able to write down, in general form, all of the rules of differentiation.

- Apply the rules of differentiation in finding derivatives.

- Given an equation containing both x and y as variables, **use implicit differentiation** to find $\frac{dy}{dx}$.
  Be able to find the slope AND the equation of the tangent line at a given point . Also determine at what point(s) the tangent line is vertical or horizontal .

- Be able to show (i.e., derive the formula) that $\frac{d}{dx}(\tan x) = \sec^2 x$
- Be able to derive one of the following derivative formulas for the inverse functions:
  $\frac{d}{dx}(\ln x) = \frac{1}{x}$ or $\frac{d}{dx}(\arcsin x) = \frac{1}{\sqrt{1-x^2}}$ or $\frac{d}{dx}(\arctan x) = \frac{1}{1+x^2}$

- Be able to use the derivative to find the equation of the line tangent to a function at a point x = a
  - Use the "local linearization" (i.e., the tangent line) to approximate function values.
  - Determine the error of estimation
  - Know the relationship between concavity and error of estimation (over- and under-estimates).
  - Illustrate all of the above using a graph.

- Apply local linearization in solving applied problems.