Mth133 – Calculus: Exam 4 Review

Note: This is not a complete list of topics – you should study your lecture notes and homework in addition to reviewing the items listed here.

1. Optimization
   the general technique is this:
   a. Draw a diagram
   b. Label your diagram and identify all of the givens and unknown quantities.
   c. Assign some symbol for the quantity your optimizing and find an equation for it in terms of the other quantities.   (i.e. A for area, D for distance, etc.)
   d. If necessary, eliminate all but one of the variables from this equation.
   e. Use our methods to find the absolute max or min.
        (i.e. take the derivative and set it equal to zero.)

2. Newton's Method
   a. first be sure your equation is some $f(x) = 0$
   b. $x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$

3. Differentials
   a. $dy = f'(x)dx$
   b. $f(x + \Delta x) \approx f(x) + dy$ (Use this to approximate values like 2.01^2 or $\sqrt{99.6}$.)
   c. d* is used to approximate the error in *

4. Indefinite integrals
   $\int f(x)dx = F(x) + C$, where $F'(x) = f(x)$

5. Area under the curve
   a. $\text{Area} = \lim\limits_{n \to \infty} \sum\limits_{i=1}^{n} f(c_i)\Delta x$, where c_i is any point in the ith interval

   (we usually use right-endpoints)

   b. To approximate the area, we can use a certain number of rectangles. Be prepared to use left-endpoints or right-endpoints