Mth 251 - Midterm 1
Review Concepts
Chapter 1, 2.1 - 2.4

Your first exam will be held during class time on Wednesday, October 18 in our regular classroom. **A 3" by 5" note card/piece of paper (back and front) and calculator will be allowed.**

Suggested study tactics:

- Reread each section - studying the examples and concepts.
- Reread the lecture notes.
- Go over your lab activities.
- At the minimum, look over the homework problems. You should not need to rework all homework problems - only those which gave you some difficulty.

- In chapter one, we have reviewed the following functions: linear, exponential, logarithmic, trigonometric, power, polynomial and rational. Some examples include: $y = 5x + 3$, $y = e^x$, $y = \ln(x)$, $y = \sin(x)$, $y = x^3$, $y = 3x^4 + 4x^2 + 1$, $y = \dfrac{(x-1)(x+2)}{(x-4)(x+3)}$. Be able to discuss the different features of each of these functions. (Sections 1.1 - 1.6)

- Given the graph of $y = f(x)$, graph $y = cf(x + h) + k$ where c, h, and k are real numbers. (1.3)

- Given the graph, table of values or symbolic form of $y = f(x)$, find the inverse of the function by graphing, making a table (using the one given), or solving algebraically. (1.3)

- For $y = A\sin(B(x - h)) + C$, find the amplitude, period and describe any shifts. Create the equation from a graph or application described using words. (1.5)

- Set up and solve applications which lead to linear or exponential equations. Know how to find the half-life and the doubling time. (1.1, 1.2, 1.4)

- Find possible formulas for graphs of functions. (1.1 - 1.6)

- Investigate limits, including right-hand limits and left-hand limits, by making an appropriate table or observing a graph. (1.8, 2.2, 2.3)

- Find $\dfrac{f(a+h)-f(a)}{h}$ (the difference quotient) which is:

  a. the slope of the secant line which contains the points $(a, f(a))$ and $(a + h, f(a + h))$,
  b. the average velocity over the time interval $[a, a + h]$ if f is the position function of an object moving along a straight line,
  c. the average rate of change of y with respect to x over the interval $[a, a + h]$. (2.1, 2.2)

- Find $f'(a) = \lim_{h\to 0} \dfrac{f(a+h)-f(a)}{h}$ which is:

  a. the slope of the tangent line to the curve $y = f(x)$ at $x = a$,
  b. the instantaneous velocity at time $x = a$ if f is the position function of an object moving along a straight line,
  c. the instantaneous rate of change of y with respect to x at $x = a$. (2.2)

- Estimate $f'(a)$ graphically and numerically (from a table). Sketch the graph of $f'(x)$ from the graph of *f*. (2.2, 2.3)
- Find $f'(x)$ using the limit definition of derivative, $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$. (Think of as the slope function.) (2.3)
- Know the difference between the slope of the tangent line, $f'(a)$, to the curve $y = f(x)$ at a point (a, $f(a)$) and the equation of the tangent line, $y - y_1 = m(x - x_1)$, where $m = f'(a)$ at that point. (2.2, 2.3)
- Interpret symbols in practical terms, giving units, as those symbols in problem 15 page 92. (2.4)