Concepts to know Exam 2: Math 142

- Section 2.1: Limits

  - limits from the left and from the right
  - numerically
  - graphically
  - algebraically
    * form of $\frac{0}{0}$
    * form of $\frac{k}{0}$ with $k \neq 0$

- Section 2.2: Limits and asymptotes

  - Vertical asymptote
    * rational functions
    * logarithmic functions
  - limits to infinity (horizontal asymptotes)
    * exponential functions
    * rational functions

- Section 2.3: Instantaneous rate of change and the derivative

  - slope of the tangent line is the same as the instantaneous rate of change.
  - find the equation of the tangent line
  - definition of the derivative
  - nderive command on the calculator and how it is used.

- Section 2.4: Derivative rules

  - notation, $f'(x)$, y', $\frac{dy}{dx}$
  - Derivative shortcut rules
    * constant, power
    * sum and difference

- Section 2.5: Derivative rules

  - product rule
  - quotient rule

- Section 2.6: Continuity and non differentiability

  - definition of continuity
  - where functions are continuous and are not continuous
    * polynomials
    * rational functions
    * exponential functions

    * piecewise functions
  - places where $f(x)$ is not differentiable
    * where $f(x)$ is not defined
    * where $f(x)$ is not continuous
    * where $f(x)$ has a sharp point(sharp turning)
    * where the tangent line is vertical

- Section 3.2: Marginal analysis

  - Notation
    * $AC(x) = \frac{C(x)}{x}$ is the average cost function.
    * MC(x) is marginal cost function. The derivative of the cost function.
    * MAC(x) is the marginal average cost function. The derivative of the average cost function.
    * The **actual** cost of A+1 item is computed by $C(A+1) - C(A)$.
    * The **approximate** cost of the A+1 item is computed by $MC(A)$.
  - similar definitions for revenue and profit functions(see page 206).

- Section 4.1: Chain rule(generalized power rule)

- Section 4.2: Derivatives of logarithmic functions.

  - You only have to know the rule for natural logarithms.
  - Using logarithm rules to simplify the function before taking the derivative.

- Section 4.3: Derivative of exponential functions.

  - You only have to know the rule for base e.

- Additional topics with derivatives.

  - Being able to simplify a derivative.
  - finding the values of x where the function has a instantaneous rate of change of (pick your favorite number). To solve this take the derivative and set it equal to (your favorite number) and solve for x.

- Section 4.5: Elasticity of Demand

  - Formulas
    * Arc elasticity, page 262.
    * point elasticity(or just elasticity), page 265.
  - results page 267 and page 266

- Any additional topics discussed in class