MAT 265

Calculus for Engineers I

Course Objectives

We expect the student to be able to handle any of the following topics. Also any material covered in class, assigned as reading, or assigned as homework is testable.

The following sections are the important concepts of Calculus I. The Student should be able to show a mastery of these concepts to prepare him or her for calculus II.

1. **Functions and Limits**
   a) Approximate a limit at a point numerically with a calculator.
   b) Find a limit at a point rigorously through common algebraic processes or with the squeeze theorem.
   c) Continuity of a function at a point.
   d) Be able to determine when a limit does not exist, including going to plus or minus infinity and find the limit at infinity

2. **Derivatives**
   a) Derivatives and Rates of Change.
   b) Find the derivative of a function using the limit definition.
   c) Compute the derivative of a function at a point using the limit definition.
   d) Find the derivative of all of the basic functions.
   e) Use the rules of differentiation (sum/difference, constant multiplier, product, quotient, and chain rule) to differentiate combinations of functions.
   f) Find an equation of the line tangent to a curve, whether the curve is given explicitly or implicitly.
   g) Related Rates and linear approximations and differentials.

3. **Exponential, Logarithmic, and Inverse Trigonometric Functions**
   a) Exponential, Logarithmic, Inverse Functions.
   b) Derivative of Logarithmic and Exponential Functions.
   c) Find the value of the derivative of the inverse of a function at a point.
   d) Find the value of a limit using L'Hôpital's rule.

4. **Applications of Derivatives**
   a) Use the derivative to graph a function, labeling local extrema and inflection points.
   b) Mean value theorem.
   c) Solve optimization problems.
   d) Find antiderivatives of basic functions.

5. **Integrals**
   a) Approximate the area or distance traveled of a function (velocity) using a small Riemann sum.
   b) Evaluate definite integrals using the fundamental theorem of calculus.
   c) Find antiderivatives of functions using the fundamental theorem of calculus.