

Calculus 1 Common Topics List¹

1. Functions

- (a) functional notation
- (b) composition of functions
- (c) inverse functions
- (d) polynomials, rationals, exponentials, logarithmic, trigonometric, inverse trigonometric, absolute value, radicals, power function
 - (i) graphs
 - (ii) continuity properties

2. Limits

- (a) intuitive definition
 - (i) graph
 - (ii) table
- (b) right- and left-hand limits
- (c) analytical procedures for computing limits
- (d) limit laws (properties of limits)
- (e) indeterminate forms (including “ $\frac{\infty}{\infty}$ ” and “ $\frac{0}{0}$ ”)
- (f) successive approximations (judging accuracy subjectively through iterations, i.e. two approximations of the same result are better than one)

3. Continuity

- (a) intuitive/graphical understanding
- (b) list of functions that are continuous on their domains
- (c) recognizing discontinuities in a function given by a formula
- (d) definition of continuity (“limit” definition)
- (e) intermediate value theorem

4. Derivative

- (a) interpretation
 - (i) rate of change
 - (ii) slope of tangent line
- (b) derivative as a function
- (c) limit definition of derivative
- (d) computing derivatives

¹This list was approved by the department on 10/15/18

- (i) rules (sum, product, quotient, chain)
- (ii) derivatives of functions listed under Functions section
- (e) max-min (single variable optimization), including word problems
- (f) higher order derivatives
- (g) velocity and acceleration
- (h) using the derivative to understand properties of graphs
- (i) local linearity (estimating a function with its tangent line)
- (j) implicit differentiation (differentiation of an implicitly-defined function, related rates)

5. Technology

- (a) exposure to computer software capable of doing calculus such as Excel, Maple, Mathematica, MATLAB, SAGE, etc.

6. Differential Equations

- (a) Is a given function a solution to a differential equation?
- (b) Using differential equations to model real world applications

Examples of Additional Topics

- Newton's method
- L'Hôpital's rule
- Euler's method
- Quadratic approximation