MCS 121
Topics

1. The derivative
   (a) Conceptually
      • as speed: as a rate of change
      • as the slope of the tangent line
      • as a limit, i.e., the "formal definition"
   (b) Calculating derivatives
      • from a table of values
      • from a graph
      • from the formal definition
      • from the rules in Chapter 3 (product rule, quotient rule, chain rule, etc)
      • implicitly
   (c) Using derivatives
      • to get information about graphs
      • to find global max and min
      • to find marginal cost, marginal revenue, etc.
      • to solve modeling problems
      • to get tangent line approximations and for local linearization
      • to implement L’Hopital’s Rule

2. The integral
   (a) Conceptually
      • as a way of getting position from velocity
      • as a sum/difference of areas
      • as a limit of Riemann sums (lower, upper, left, or right . . .)
   (b) Fundamental Theorem of Calculus
   (c) Calculating definite integrals
      • calculating left and right sums from a table
      • using the R-Sums program: understanding what it does
      • using areas (rectangles, triangles, parts of circles, etc.)
      • using antiderivatives (The Fundamental Theorem, mentioned above . . .)
   (d) Finding antiderivatives
      • graphically
      • numerically
      • analytically (derivative rules backwards)
      • using the Second Fundamental Theorem