This test covers everything done in class on Jan 30 – March 4 and the types of homework problems assigned on those days. The topics and problems include computation of the definite integral from the limit definition, topics on the outlines for Quizzes 4, 5, and 6, and the topics below. Notice that material that appeared on the quiz outlines but did not appear on the quizzes may well appear on the test.

It is important to review material from Test 1 in studying for Test 2, because many of the problems for Test 2 involve having Test 1 material at your fingertips. Besides the computation of the definite integral from the limit definition, other examples include the basic integral list, integration by substitution (which comes up in all other methods of integration), properties and derivatives of logarithms and exponentials, inverse trig functions, etc.

Reminder: The test is on Friday March 6 at 10:30am. You will need a non-programmable, non-graphing calculator. An optional review session will be held on Thursday March 5 at 12:45pm in Bailey 201 (not the usual room).

New material since the last quiz:

- General framework for applications of integration  
  (Be able to articulate this.)
  
  A. To use integration in an application:
    1. Approximate what you want as a Riemann sum.
    2. Write an exact expression for what you want as the limit of a Riemann sum.
    3. Rewrite this limit as a definite integral.
    4. Evaluate the integral using FTC.

  B. Our goal is to learn to understand and use the framework, not to come up with formulas for area, volume, etc.

- Area  
  Given a region in the $xy$-plane, be able to use the general framework to compute its area.
    - Express the area as the limit of a Riemann sum; be able to use a partition of either the $x$-axis or the $y$-axis.
    - Express the area as a definite integral.
    - Evaluate using the FTC.

  A solution to an area problem should include a detailed sketch showing a typical rectangle with labeling at appropriate points on the graphs and on the axes.

- Volumes of revolution  
  - Spinning a rectangle around a line generates a washer:
    
    \[ \text{Volume of washer} = \pi (\text{big radius})^2 (\text{thickness}) - \pi (\text{small radius})^2 (\text{thickness}) \]

  - Know how to use this idea to get a Riemann sum for a volume of revolution and translate it into an integral. A solution to a volume problem should include a detailed sketch showing a typical rectangle with labeling at appropriate points on the graphs and on the axes.
    * Draw a picture of the region being revolved and its mirror image.
    * Partition the appropriate axis (parallel to the line being revolved around).
    * Draw in an appropriate rectangle, labeling appropriate points.
    * Find the volume of the $k$th washer (or disk).
    * Express the volume as the limit of a Riemann sum.
    * Translate the Riemann sum into a definite integral and evaluate using the FTC.