Math 1b:

Reading assignments will be posted by unit: Integration, Series, and Differential Equations. If any changes are made once a unit has commenced, you will be sent an e-mail alerting you to the change.

All numbers indicate sections from Stewart's **Calculus: Concepts and Contexts** 2nd edition unless it says **G**, in which case it is from supplementary material (written by the coursehead) which will be made available to you. It is password protected: you can get the password and login from your teacher.
(Last modified: September 26, 2004 by RG)

Reading Assignments for the Integration Unit TTH version

Note to students: If we followed the order of the textbook we would have to start out with techniques of integration, but that would give you the wrong impression about the type of course you are taking. In addition, some students come into this course knowing some techniques of integration and others do not. We would like to have our course start out with an equal playing field and we'd like each of you to see something new in the first few classes. Therefore, we will do start with applications of integration (Chapter 6) in the first week of the course, include some non-standard applications from supplementary materials in order to guarantee that you will be able to apply integration whenever you need to in your future career, and then get to techniques of integration from Chapter 5. We'll save improper integrals and probability for the end of this unit because (i) the latter is an application of the former (ii) improper integrals stretch the definition of the definite integral so it is logical to place it at the end of the unit and (iii) the language and ideas used are closely related to the ideas of the series unit that follows this one.

(1) For Tuesday September 28

Review:

Section 5.1 Areas and Distances
Section 5.2 The Definite Integral

Section 5.3 Evaluating Definite Integrals
Section 5.4 The Fundamental Theorem of Calculus

Section 6.1 More About Areas

Reading : Sections 5.1 through 5.4 should be review. Skim them to remind yourself about Riemann Sums and the Fundamental Theorem of Calculus.
6.1: all except Areas Enclosed by Parametric Curves

Key areas of focus : From 5.1-5.4: What is a Riemann Sum and why do they look the way they do? Understand the statements of both forms of the Fundamental Theorem of Calculus. Know the interpretation of the definite integral as signed area 'under' a graph.
In 6.1:Look at the area between curves in Figure 1: You may be accustomed to viewing this as the sum and/or difference of signed areas between a curve and the x-axis. Notice the different way of thinking about this presented in this section. Notice that Example 4 is a special case of the general idea that the area under a rate curve is the net change in amount. Understand the geometry behind integrating with respect to y (as in Example 5).

Reading Questions :

1. Answer one of the following:
    a. What was the most confusing or difficult part of this reading?
    b. What questions did this reading bring up for you?

(2) For Thursday September 30

Section 6.2 Volumes and Volumes of Revolution

Reading : All

Key areas of focus : Understand finding volumes by slicing a solid as one would slice a loaf of bread. Then think about the special case of volumes formed as solids of revolution. For another take on volumes of revolution you can read G: 28.1 pp. 856-862.

Reading Questions :

1. Consider the region bounded below by y = 2x, above by y = 8, and on the left by the y-axis. Rotate this region about the y-axis to get a cone. Write an integral that will give you the volume generated, and check your answer by using the formula for the volume of a cone.

2. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

(3) For Tuesday October 5

Section G: 27.1 Slicing
Sections 6.3 Arc Length

Reading : All of G:27.1
6.3: give this only a quick read to get the main gist – we'll take a different approach in class. We won't be dealing with parameterized curves.

Key areas of focus : G: 27.1 Understand what determines how you slice the region or interval under consideration. Concentrate on how the integrals are obtained from the approximating Riemann sums rather than looking for formulas.
6.3 Concentrate on making some sense of formula #2 on p. 469..

Reading Questions :

1. G:27.1 #1
2. How are the problems in this section related to previous problems of area and volume?
3. Look at formula 2 on p. 469. Let a=1 and b = 4. Suppose y = c, where c is constant. What does the formula give for the length of the curve from a to b? Does this make sense? The formula says that the larger (dy/dx)^2, the larger the arc length. Explain why this makes geometric sense.
4. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

(4) For Thursday October 7

Section 6.4 Average Value
Section 6.5 Applications to Physics and Engineering

Reading : read pp. 476-479
6.4 : everything
Key areas of focus : In 6.5 work as an application of integration. Read about hydrostatic pressure, moments, and centers of mass only if you have an interest in these physics topics.
In 6.4, read all two pages.

Reading Questions :

1. 6.4 #2. Think about this graphically. Do you expect the answer to be bigger or smaller than sqrt(2.5)? Why?
2. 6.5 #3 (Note that the first line allows you to figure out the spring constant for the spring.) Why is it necessary to write an integral to do this problem?
3. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

(5) For Tuesday October 12

Section 5.5 Integration by Substitution
Section 5.6 Integration by Parts

Reading : All
Key areas of focus : 5.5: Pay attention to the endpoints of integration when substitution is used on a definite integral. Focus also on the subsection on symmetry. One can often get a lot of mileage out of it. Please don't think of substitution as "introducing something extra" but rather as unveiling the underlying structure.
5.6 What kinds of integrals lend themselves to this method of integration? How do you decide what to call "u" and what to call

"dv"?

Reading Questions :

1. Substitution attempts to undo one of the techniques of differentiation. Which one is it?
2. 5.5 #28
3. 5.6 # 3
4. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

(6) For Thursday, October 14

Section 5.7 Additional Techniques of Integration

Reading : all

Key areas of focus : partial fractions: understand what it means to be a linear non-repeated factor, a linear repeated factor, a quadratic factor. . .(don't worry about repeated quadratics).
Think about how you would make decisions about which integration tool to use in any given situation.

Reading Questions :

1. 5.7 #15
2. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

(7) For Tuesday October 19

Section 5.9 Approximate Integration
Section 5.10 Improper Integrals
Reading : 5.9 Go lightly on the error estimates. Concentrate on the pictures of what is being done.

Key areas of focus: 5.9 What are the various methods of approximation? Which is most accurate?
5.10 What are the two ways in which an integral may be improper? How do we approach the problem of improper integrals?

Reading Questions

1. When might you actually use numerical methods of approximation?
2. In order for an improper integral from 0 to infinity or f(x) to be convergent, is it necessary that the limit of the integrand as x increases without bound goes to zero?
   Is that sufficient to guarantee convergence?
3. do 5.10 #15
4. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

(8) For Thursday, October 21

Section 6.7 Probability

Reading : Depending upon where we are in our classes at this point you may or may not be asked to read about average values.

Key areas of focus : What is necessary for a function f to be a probability density function? For continuous probability we talk about the probability of being in an interval, not at a certain value.

Reading Questions :

1. Is it possible that f(x)=sin(x) is the probability density function associated with a continuous random variable? Why or why not?
2. Is the annual income of all wage earners in the United States is normally distributed? Explain.
3. Answer one of the following: What was the most confusing or difficult part of this reading? What questions did this reading bring up for you?

For Tuesday October 26

No advance reading today. Study for your exam.
We will start studying series in class: Be there!