Math 162 Section 2, Spring 2008
Calculus 2
10:50-12:05 TTh CNS E101

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Text:	Varberg,Purcell, Rigdon, **Calculus**, 9^{th} edition, Pearson-Prentice Hall

Course Description

In Calculus 1 you learned what limits are, what a derivative is, how to find both, and how to apply derivatives to maxima and minima and graphing. In Calculus 2 we turn or attention to integral calculus for functions of one real variable. For limits the hard part is figuring out what the definition means, finding them is usually fairly straightforward. Derivatives aren't as hard to define and can be found fairly mechanically by applying a small collection of rules. Applying differentiation to real world situations of interest involves using fairly deep theorems.

For integral calculus the situation is different: the definition, while rather involved, looks exactly like the situations in which it can be applied. We start by looking at the problem of finding the area under the graph of a function and then realize that lots of other situations can use the same "slice and add, then take a limit" approach. We can even use the definition to find fairly good approximations.

One of the deepest theorems in calculus is the Fundamental Theorem of Integral Calculus, a key result based on properties of continuous functions and the Mean Value Theorem which tells us that finding integrals is just like doing derivatives backwards: given the answer to a differentiation problem, find the question. For easy cases this gives a way to find integrals exactly. But there isn't a mechanical set of rules to follow.

So we need to develop some technique. There is a reasonably large bag of

tricks that have been developed to find integrals. They involve recognizing when substitutions will help (undoing the chain rule), using trigonometric substitutions to deal with quadratics, using algebra to break problems into standard types, undoing the product rule (integration by parts), and a bunch of tricks which we know mostly because someone tried them once and wrote them down when they worked.

Before we can do some of this technique we will need to know about some further transcendental functions: the natural logarithm, its inverse function (the exponential), inverse trig functions, hyperbolic functions, and inverse hyperbolic functions.

All of this works for definite integrals of functions which are continuous on a closed interval. If the function isn't continuous we break the interval at points of discontinuity so the trouble happens only at one end point and then take a limit of integrals over intervals approaching the one with the discontinuity. A similar technique works for limits with one infinite endpoint on the interval. These are called improper integrals. In order to do some of the standard ones we'll also need a bit more on how to find limits of indeterminant forms.

Exams and Grading

There will be three exams of equal weight: One on the definition and applications of the definite integral, one on transcendental functions and their uses, and one on technique and improper integrals. The third is at the time for the final. Tentative dates for the exams can be found on the calendar (on line at http://www.iwu.edu/∼lstout/Calculus2/Calc2CalF07.html). Homework will be due every Tuesday.

I will use a straight scale for determining grade. To allow flexibility at boundaries, I reserve the right to change the boundaries, but will draw them no higher than:

A : 90% or over
A-: [87,90)
B+: [83,87)
B : [78,83)
B-: [75,78)
C+: [70,75)
C : [65,70)
C-: [60,65)
D : [50,60)
F : below 50%

Note: The line for passing will not move, the others *may* move downward.

Attendance Policy

I expect you to read the relevant sections of the book before the class where I will be discussing them. Classes and office hours are what you pay tuition for, so take advantage of them. If you don't come to class you will not learn the material with the same emphasis that I put on it. There is no deduction of points for classes missed.

Policy on Academic Integrity

Work handed in for a grade is expected to be your own work. On daily learning there is something to be gained by talking with your fellow students: study groups and/or discussions on the material and homeworks are encouraged in this course. However, you do have to pay special attention of your ability to work independently: understanding the material and being able to solve problems on your own is what you need for quizzes and examinations. All quizzes and exams require all work to be done individually. Any cheating on exams or quizzes will be treated as a violation of the policy on academic dishonesty in the student handbook and will be reported to the Associate Provost.