Math 125: Calculus II - Dr. Loveless

Essential Course Info

My Course Website:	math.washington.edu/~aloveles/
Homework Log-In (use UWNetID):	webassign.net/washington/login.html
Directions for Webassign code purchase:	math.washington.edu/webassign
Math Department 125 Course Page:	math.washington.edu/~m125/

First week to do list

1. Read 4.9, 5.1, 5.2, and 5.3 of the book. Start attempting HW.
2. Print off the "worksheets" and bring them to quiz sections.

Today

- Syllabus/Intro
- Section 4.9
  - antiderivatives

1st HW assignments

Closing time is always 11pm.

- HW1A,1B,1C close Oct 4 (Wed)
  (covers 4.9, 5.1, and 5.2)

Expect 6-8 hrs of work, start today!

What we will do in this course:
We learn the basic tools of integral calculus which provide the essential language for engineering, science and economics. Specifically,

1. **Ch. 5 – Defining the Integral**
   - Definition and basic techniques

2. **Ch. 6 – Basic Integral Applications**
   - Areas, Volumes
   - Average Value
   - Measuring *Work*

3. **Ch. 7 – Integration Techniques**
   - by parts, trig, trig sub, partial frac

4. **Ch. 8-9 – More Applications**
   - Arc Length, Center of Mass
   - Differential Equations

5. **Practicing Algebra, Trig and Precalc**

Students often say: The hardest part of calculus is you have to know all your precalculus, and they are right.

Improving your algebra, trig and precalculus skills will be one of the best benefits you will gain from this course (arguably as valuable as the course content itself). You will use these skills often in your other courses at UW.

Entry Task: Differentiate

1. $F(x) = \frac{7}{x^{10}} - 5\sqrt{x^3} + 4\ln(x)$
2. $G(x) = e^{6x} + 5\tan(x) + \pi$
3. $H(x) = 2\tan^{-1}(x) - 3 + e$
4. $J(x) = x^3\cos(4x) + \ln(2)$

4.9 Antiderivatives

Goal: Before we jump into defining integrals (ch. 5), we need to remember some derivatives (in reverse).

Def'n: If g(x) = f'(x), then we say

g(x) = "the derivative of f(x)", and

f(x) = "an antiderivative of g(x)"

Example:

Give an antiderivative of $g(x) = x^2$.

Examples (you do):

Find the general antiderivative of

1. $f(x) = x^6$
2. $g(x) = \cos(x) + \frac{1}{x} + e^x + \frac{1}{1+x^2}$
3. $h(x) = \frac{5}{\sqrt{x}} + \sqrt[3]{x^2}$
4. $r(x) = \frac{x-3x^2}{x^3}$

Initial Conditions

There is no way to know what "C" is unless we are given additional information about the antiderivative. Such information is called an **initial condition**.

Example: $f'(x) = e^x + 4x$ and
$f(0) = 5$

Find $f(x)$.

Example: $f''(x) = 15\sqrt{x}$, and
$f(1) = 0, f(4) = 1$

Find $f(x)$.

Motivational: You know the acceleration or velocity function for some object. What is the original function for the position of the object?

Example:
Ron *steps off* the 10 meter high dive at his local pool. Find a formula for his height above the water.
(Assume his acceleration is a constant 9.8 m/s^2 downward)