

# Calculus II Honors Fall 2009

## Homework 10

Due: Wed. Nov. 11, start of class

**Instructions:** Please read the homework policies and guidelines posted on the course webpage. You may *not* use a calculator (or computer) except where stated. Make sure to write your name, course and section numbers in the top right corner of your solution set, as well as the assignment number on top. Page/section numbers refer to the course text.

### Written Assignment

Total: 100 points.

All problems are worth 5 points except where noted.

**Section 8.5:** 1, 9, 33, 37

**Section 8.8:** 2, 11, 14, 35, 36, 52, 55, 57, 59, 63, 67, 69 (use a calculator), 71 (10 pts—the Laplace transform is important in differential equations, which we will touch on later)

**Problem A:** (10 pts) Define the *Gamma function* by

$$\Gamma(x) = \int_0^{\infty} t^{x-1} e^{-t} dt$$

(i) Using integration by parts, show that

$$\Gamma(x + 1) = x\Gamma(x).$$

(ii) Compute  $\Gamma(1)$ .

(iii) Using (i) and (ii), show  $\Gamma(n + 1) = n!$  for  $n$  a natural number.