

## Math 135, Winter 2015, Homework 2

### For practice - do not hand in

**Section 11.6**, Problems 13, 19, 38, 58.

**Section 11.7**, Problems 13, 21, 23, 60.

**Section 12.1**, Problem 23.

**Section 12.2**, Problems 12(a), 15, 28, 29, 31, 35, 36.

**Section 12.3**, Problems 56, 15, 19, 33, 35.

### To hand in

1. Problem 69 in Section 11.7.
2. Find the Laplace transform of  $f(x) = x^n$  where  $n$  is a positive integer. See Problem 62 in Section 11.7.
3. Problem 28 in Chapter 11 Review Exercises.
4. Problem 42 in Section 12.2.
5. (a) Show that  $\int_2^\infty \frac{dx}{x(\ln(x))^p}$  converges if and only if  $p > 1$ .  
(b) Show that  $\sum_{k=2}^\infty \frac{1}{k(\ln k)^2}$  converges and that its sum equals 2.1 to one decimal place (i.e. with an error less than 0.05).  
(c) Show that  $\sum_{k=2}^\infty \frac{1}{k(\ln k)}$  diverges, but that

$$8.10 \leq \sum_{k=2}^{10^{1000}} \frac{1}{k(\ln k)} \leq 8.83$$

as you can see, this series diverges *very* slowly! If you tried to detect the divergence experimentally by adding a few million terms on the computer, you would not succeed.