

Name (please print):

Math 213, Spring 2006  
HW Assignment 9

## Instructions

- **Write your name on the cover sheet and staple the sheet to the assignment.** Do the problems in order, and make sure that each problem is clearly labelled.
- **Deadline:** Friday, March 31. (Note that this is also the due date for the assignment handed out before the break, HW 8.)
- **Open House:** Wednesday at the usual place and time (5 pm, 147 Altgeld).

## Things you should know

In order to do these problems, you will need to know some standard power series expansions, in particular, those of the following functions (see the table on p. 440):

- $(1 + x)^n$  (binomial theorem ( $n$  positive integer))
- $(1 + x)^u$  (extended binomial theorem ( $u$  any real number))
- $\frac{1}{1-x}$  (geometric series)
- $\frac{1}{(1-x)^n}$  ( $n$  positive integer)
- $e^x$  (exponential series)
- $\ln(1 + x)$  (logarithmic series)

—Turn page for problems—

## Warmup exercises (not graded)

The following exercises are of the “plug in” variety; they simply test your knowledge of the appropriate concept or formula (such as a power series expansion). In contrast to some combinatorial problems that have come up in the past, these problems require very little (if any) serious thought, and you should be able to do them virtually in your sleep.

To get the most benefit from these problems, try to do them under exam conditions, without resorting to notes or books. Of course you could look things up, but that would defeat the purpose of these problems.

Problems marked by an asterisk (\*) are particularly instructive, so make sure you can do those.

**All problems are from Section 6.4 (Generating functions).**

1. Problem 5, parts (a), (b), (d)\*, (e), (f)\*
2. Problem 7, parts (a), (c), (g), (h)
3. Problem 9, part (a), (b)
4. Problem 11, part (a), (c), (e)

## Other problems (graded)

**All are from Section 6.4.**

5. Problem 16 (a donut type counting problem with constraints)
6. Problem 20 (a postage stamp type problem)
7. Problem 24 (counting solutions to integer equations with constraints via generating functions)
8. Problem 40 (an exercise in manipulating generalized binomial coefficients; contrary to what the asterisk designation might suggest, it's not particularly difficult, especially since the answer is given in the problem)
9. Problem 43 (proof of an identity via generating functions; a generalization of Example 18)