

## Review for Exam over Chapter 5 in CS 113

There were two kinds of ideas in this chapter.

1. The first was recurrence relations, viewed mathematically.

You should be able to solve a recurrence relation.

The two methods we know are iteration, and a method of solving linear recurrence relations with constant coefficients. We can solve those if they are homogeneous or have a polynomial in  $n$  on the right side. You will be given the tables from the lectures for the non-homogeneous recurrence relations on the test (those like p. 244, #41-46)

2. The second was applications. Here are some sample applications to know.

p. 232, #4-8, 22, 38, 39, 40, 50, 51, 69, 70, 71

p. 244, #1-23, 34, 41-46

p. 256, #17-20, 22-26

The application problems on the test will require you to convert the word problem to a recurrence relation and then to solve the recurrence relation.

## Leftovers from Chapter 4

1. We learned about binomial identities.

Know the notation and what it means:  $P(n,r)$ ,  $C(n,r)$

Be able to use Pascal's triangle and/or the definition of the combinatorial coefficients and/or the Binomial Theorem to verify combinatorial identities.

Be able to expand the expression  $(x + y)^n$  using the Binomial Theorem.  $x$  and  $y$  don't have to be just letters.

2. We learned about the Pigeonhole Principle

Version 1: At least  $k+1$  pigeons,  $k$  holes implies that some hole has  $\geq 2$  pigeons

Version 2:  $f: X \rightarrow Y$ , both  $X, Y$  finite with  $|X| > |Y|$ . Then  $f(a) = f(b)$  for some different values of  $a$  and  $b$

There is another version in the book that would be worth checking out.