

MATH 145, MIDTERM 1 SAMPLE PROBLEMS

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1. Find the coefficient of  $x^6y^2$  in the expansion of  $(x + 2y)^8$ .
2. How many anagrams are there of the word "committee"?
3. How many eight digit numbers are there with exactly 3 sevens?
4. How many different ways are there to make up a dozen cookies from 10 chocolate chip, 5 oatmeal and 15 raisin cookies?
5. What is the following sum:  $0\binom{n}{0} + 1\binom{n}{1} + 2\binom{n}{2} + \dots + n\binom{n}{n}$ . Experiment, conjecture the value, and prove it.
6. How many ways are there to distribute 12 presents among 4 children?  
How many ways to do it are there if each child must get at least two presents?
7. How many subsets does the set  $\{1, 2, 3, \dots, n\}$  have that contain no two consecutive integers?

Midterm 1 will cover: Chapter 1 material including theorems 1.3.1, 1.6.1, 1.7.1, 1.8.1, 1.8.2; sections 2.1, 2.3, 2.4, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 through problem 3.7.2, 4.1, 4.2.