

8) I found a long list of problems suitable for a 574 Final Exam. Twenty of the problems involve counting and 30 of the problems involve graph theory. How many possible exams can I create if I choose 11 counting problems from the list and 9 graph theory problems from the list? (Note: two exams are considered to be the same if they have the same questions. The order of the questions does not matter.)

$$\binom{20}{11} \cdot \binom{30}{9}$$

9) City council consists of 11 people. Each person from council will serve on exactly one committee. The Zoning Committee will have 4 members. The garbage committee will have 3 members. The cable TV committee will have 2 members, and the water committee will have two members. How many ways are there to make committee assignments?

$$\binom{11}{4 \ 3 \ 2 \ 2} = 69,300$$

10) What is the coefficient of x^2y in $(1+2x+3y)^7$?

$$(1+2x+3y)^7 = \dots + \binom{7}{4 \ 2 \ 1} (1)^4 (2x)^2 (3y)^1 + \dots$$

coef of x^2y is $\binom{7}{4 \ 2 \ 1} 4 \cdot 3$

$$\frac{7 \cdot 6 \cdot 5}{2} \cdot 12 = 105 \cdot 12 = 1260$$