

McGill University
Math 240: Discrete Structures 1
Assignment 5: due Friday, November 25, 2005

Reading: Text 4.1: The Basics of Counting, 4.2: The Pigeonhole Principle, 4.3: Permutations and Combinations, 4.4: Binomial Coefficients, 4.5: Generalized Permutations and Combinations, 6.1: Recurrence Relations, 6.2: Solving Recurrence Equations, 6.5: Inclusion-Exclusion, 6.6: Applications of Inclusion-Exclusion

Questions:

1. How many solutions $(x_1, x_2, x_3, x_4) \in \mathbb{N}^4$ are there to the equation

$$x_1 + x_2 + x_3 + x_4 = 17$$

if

- (a) $x_1 \geq 1$ and $x_2 \geq 3$;
- (b) $x_1 \leq 5$;
- (c) $x_1 < 8$ and $x_2 > 8$;
- (d) $x_1 \leq 1, x_2 \leq 2, x_3 \leq 4$ and $x_4 \leq 4$.

2. Solve the recurrence equation

$$a_{n+3} = 6a_{n+2} - 11a_{n+1} + 6a_n,$$

where $a_0 = a_1 = a_2 = 1$.

3. Find the solution of the recurrence equation

$$a_{n+2} = a_{n+1} + 6a_n + 1 + n + 2^n,$$

where $a_0 = 1, a_1 = 2$.

4. In how many ways can eight distinct balls be distributed into three distinct urns if each urn must contain at least one ball.
5. How many strings with 5 or more characters can be made from the string *SEERESS*.