

Name/CSE Login _____

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Instructions Follow instructions *carefully*, failure to do so may result in points being deducted. Clearly label each problem and submit the answers *in order*. It is highly recommended that you typeset your homework using \LaTeX or a similar typesetting system. Staple this cover page to the front of a hardcopy of your assignment for easier grading. Late submissions *will not be accepted*. Be sure to show sufficient work to justify your answer(s). If you are asked to prove something, you must give as formal, rigorous, and complete proof as possible. You are to work individually, and all work should be your own. The CSE academic dishonesty policy is in effect (see http://www.cse.unl.edu/undergrads/academic_integrity.php).

Partner Policy You may work in pairs, but you must follow these guidelines:

1. You must work on *all* problems *together*. You may not simply partition the work between you.
2. You must use \LaTeX and you may divide the typing duties however you wish.
3. You may not discuss problems with other groups or individuals.
4. Hand in only one hard copy under the first author's name.

Problem	Points	Score
5.1.22	10	
5.1.58	10	
5.2.16	10	
5.3.12	10	
5.3.18	10	
7.1.8a-d	20	
7.2.4a-d	20	
7.2.24	10	
Bonus A	10	
Bonus B	10	
Bonus C	10	
Total	100	

Topics: Recursion (7.1–7.2), PIE , Combinatorics (5, 7.5–7.6)

Comments: 7.1.8 and 7.2.4: use any method you like. Partial credit will not be given for bonus questions. A full and complete answer is required.

Bonus A Consider an $n \times n$ grid. Say we want to take a path from $(0, 0)$ to (n, n) without ever “back-tracking” (traveling west or south). How many different unique paths are there? Explain your answer. Hint: Find a formula for

$$\binom{n}{0}^2 + \binom{n}{1}^2 + \binom{n}{2}^2 + \cdots + \binom{n}{n}^2$$

Bonus B Consider an $n \times n$ chess board. How many ways can two squares be chosen so that they are not in the same row or column?

Bonus C Suppose that we have three different toys and want to give them away to three children (one toy each) selected from a pool of 4 boys and 6 girls.

- (a) How many ways can this be done?
- (b) If we place the restriction that at least two boys get a toy, how many ways can this be done?