

NAME: _____

This quiz contains 7 problems worth 30 points. You may not use books, notes, or a calculator. You do not have to simplify your answers. You have 30 minutes to take the quiz.

1. (3 points each)

(a) Determine the number of strings that can be formed by ordering the letters in the word ENGINEER.

(b) Determine the number of strings that can be formed by ordering the letters in the word ENGINEER if no two E's are allowed to be consecutive.

2. (4 points) Find the number of integer solutions to $x_1 + x_2 + x_3 + x_4 = 30$ subject to the conditions $x_1 \geq 0$, $x_2 \geq 0$, $x_3 \geq 1$ and $x_4 \geq 2$.

3. (2 points each) For each 5-combination of $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, give the 4-combination that is next lexicographically:

(a) 34678

(b) 24789

4. (2 points) Explain why the algorithm we described in class (i.e. Algorithm 6.4.9 in your book) that generates all r -combinations of a given n -set would never produce the following output: 4286.

5. (2 points) For each permutation of $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, give the permutation that is next lexicographically:

(a) 873261945

(b) 957341268

6. (2 points each) Find the coefficient of the term when the expression is expanded:

(a) $x^5y^2z^3; (x + y + z)^{10}$

(b) $x^2y^3; (5x - y)^5$

7. (3 points each)

(a) Fill in the box below in the statement of the Binomial Theorem:

If a and b are real numbers and n is a positive integer, then

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(b) Use the Binomial Theorem to prove that $2^n = C(n, 0) + C(n, 1) + C(n, 2) + \cdots + C(n, n)$.