You MUST use good notation and show appropriate work.

Math 102 (Section 12.3C)

Name _____

12.3C More Practice with Permutations and Combinations

1. The board of directors of a corporation has 15 members. In how many ways can an executive committee of 4 members, (President, VP, Treasurer, and Secretary) be chosen?

2. How many ways can the same board of directors choose a delegation of 4 members where all the delegates have equal standing?

3. There are 20 singers auditioning for a musical. The director wants to choose two people to sing a duet and everyone auditioning is capable of singing either part. In this situation:

$_{20}C_2$ would be the number of ways to _____.

$_{20}P_2$ would be the number of ways to _____.

4. How many ways can the director choose a lead singer and a backup singer from the 20 persons auditioning?

5. In the situation where the director is choosing a quintet (5 singers):

$_{20}P_5$ would be the number of ways to _____.

$_{20}C_5$ would be the number of ways to _____.

6. There are 117 Division I-A college football teams. How many different TOP 25 rankings lists are possible?

7. For the same 117 teams, how many ways are there to choose 8 teams for a playoff?

8. Four men and four women line up at the checkout stand in a grocery store. In how many ways can they line up?

9. In how many ways can 4 men and 4 women line up if they must alternate woman, man, woman, man, and so on and if a woman must always be first in line?

10. The ski club has 35 members (15 females and 20 males).

a. How many ways are there to choose a president, vice-president, and treasurer (no one can serve in two offices at the same time).

b. How many different ways can the president, vice-president, and treasurer be chosen if there is the additional requirement that the president must be female?

c. How many different ways can these 3 offices be filled if there is a regulation that says the top 3 offices can NOT be held by all men or by all women?

11. How many 7-digit numbers (i.e, numbers between 1,000,000 and 9,999,999) are even numbers?

12. How many 7-digit numbers (see above) are divisible by 5?

13. A computer password consists of 4 letters (A through Z) followed by a single digit (0 through 9). Assume that the passwords are case sensitive (i.e., uppercase letters are considered different from lowercase letters).

a. how many different passwords are possible?

b. how many different passwords start with Z?

c. How many different passwords do not start with either z or Z?

d. How many different passwords have no Z's in them, either uppercase or lowercase?

14. A set of reference books consists of 8 volumes numbered 1 through 8.

a. In how many ways can the 8 books be arranged on a shelf?

b. In how many ways can the 8 books be arranged on the shelf so that at least 1 book is out of order?

15. A restaurant offers a menu consisting of 3 different appetizers, 2 different soups, 4 different salads, 9 different main courses, and 5 different desserts.

a. A **fixed-price lunch** meal consists of a choice of appetizer, salad, and main course. How many different lunch fixed-price meals are possible?

b. A **fixed-price dinner** meal consists of a choice of appetizer, a choice of soup or salad, a main course, and a dessert. How many different dinner fixed-price meals are possible?

c. The **dinner special** consists of a choice of soup or salad or both, and a main course. How many dinner specials are there?

16. As part of a prime-time TV game, the player wins $1,000,000 if the first four cards drawn from a shuffled poker deck are an Ace, a King, a Queen, and a Jack (in any order). How many 4 card combinations of this type are "winning" foursomes?

17. If the player draws four cards from the deck (same game as above) and the cards drawn are an Ace, a King, a Queen, and a Jack, in that order, the player wins the GRAND SLAM of $100,000,000. How many ways are there to draw a GRAND SLAM in this game?

18. How many different ways are there to draw 4 cards from a poker deck, if the order they are drawn in does not matter?