Assignment: Permutations

Use the permutation formula ${}_nP_r = \frac{n!}{(n-r)!}$ to solve each problem. Be sure to show all work leading to your answer.

Part I: Solve Real-world Permutation Problems

Choose any four (4) of the following five problems to solve. For each problem a) show how the permutation formula can be used to find the answer and b) write a sentence to explain the meaning of the answer for the situation.

1. To register for online banking services at a local credit union, you need to select a four-digit personal identification number, or pin code. The digits cannot be repeated. How many ways are there to arrange four digits out of the numerals 0 through 9 to create a code?

2. A clothing designer enters a competition to show ten original outfits at a fashion show. If the designer has 12 outfits to choose from, how many ways are there to arrange the order in which he will show ten of them?

3. The community 10K run/walk event awards ribbons to the top four finishers in each age category. If 20 people in the 15-19 age range register for the race, how many ways are there to arrange the top four finishers?

4. A new computer store offers a special early-bird prize give-away for its grand opening. The first 12 customers to enter the store between 7 a.m. and 8 a.m. will receive gift certificates worth various dollar amounts. If 18 customers gather to enter the store between those hours, how many ways are there to arrange the twelve prize winners?

5. A state university issues five-digit student identification numbers to all of its students. None of the identification numbers contain the digit 0 and the digits cannot be repeated. How many ways are there to arrange five digits if only the numerals 1 through 9 are used?

Part II: Create Your Own Permutation Problem

6. Now create your own original problem where you can use the permutation formula to find the number of ways to arrange some items out of a larger group.

   a. In 2-3 sentences, write a description of the problem, including the number of items altogether and the number of items that need to be arranged.

   b. Show how to use the permutation formula to solve the problem. Show all steps necessary to find the answer.

   c. Write a sentence to explain the meaning of the answer for your problem.