Mathematics 30-2 Unit 2 Assignment #3: Permutations & Combinations

Name:__________

Determine the following (1 mark each)

The Hunger Games, Catching Fire and Mockingjay are three books in a popular series of novels by Suzanne Collins that depict the harsh reality of life in a post apocalyptic society called Panem (formally North America).

1. In the story, 12 districts must regularly send a teen boy and girl known as “Tributes” to the Capitol district to compete in the hunger games. As the games begin, President Coriolaunus Snow addresses the contestants with a traditional phrase “May the odds be ever in your favor.”

   a) How many different first names could President Snow create using the letters in Coriolaunus?

   b) How many different first names could he create, if the consonants in Coriolaunus are kept together?

   c) How many different first names could he create using Coriolaunus, that end with an ‘vowel’?

   d) How many different first names could he create, if he kept the consonants in alphabetical order?

   e) How many different first names could he create, if he didn’t repeat a letter in that first name?

2. Katniss Everdeen volunteered to become a “tribute” after her younger sister was selected for the hunger games. Assuming that there were 64 boys and 59 girls who were eligible to be selected that year from her district as “tributes,” then:

   a) how many ways could 2 youths be selected from the entire group of eligible youths?

   b) how many ways could a single boy and girl be selected as “tributes” from the eligible youths?

   c) Some families had to offer more than one child for the selection process. If there were 14 pairs of brother and sister groups among the eligible youths, then how many ways could a girl be selected first followed by her brother to compete in the hunger games?
3. During a regular year, two youths (one male and one female) were selected from each of the 12 districts to compete in the hunger games. However during the second “Quarter Quells” the process changed to include a second boy and girl also selected from each of the 12 districts as tribute. On the night before the games, all tributes are paraded before the citizens of the Capitol District.
   a) How many different ways can the 24 youths be lined up to be paraded before a regular hunger games begin?

   b) How many different ways can the 24 youths be paraded if they enter in pairs representing each of the 12 districts?

   c) How many different ways can the 48 youths be paraded if they enter in groups of four representing each of the 12 districts during the second Quarter Quell?

4. The winners of the hunger games are called victors. If they help prepare tributes for future games, then they are also known as mentors. In the 75th and final hunger games (the third Quarter Quell), the tributes for this final hunger games are selected from all of the victors of the previous games.
   a) Assuming that all victors are still alive, and that there was only one victor for each game*, state the probability that Katniss Everdeen (a victor) wins the final hunger games.

   b) Suppose that prior to the final games, each participant shakes the hands of every other participant in this last hunger game. How many hand shakes would have occurred if this actually happened in the novel?