MAT 223, Discussion Questions 10.14

1. What is the value of each of these expressions containing factorials?
   a. $5!$ 120 c. $0!$ 1 d. $9!$ 362,880
   b. $\frac{9!}{3!}$ 60,480 e. $\frac{10!}{5!5!}$ 252

2. When we are counting things, what two conditions need to be satisfied to use combinations?

   Order does not matter
   no repetition

3. When we are counting things, what two conditions need to be satisfied to use ~~combinations?~~ permutations

   Order does matter
   no repetition

4. Give a situation where you would use combinations. answers will vary

   hands in poker committees
   couples

5. Give a situation where you would use permutations. answers will vary

   Standing in line
   baseball batting line-up
   Selecting cards in order

6. Give three notations for combinations, and three notations for permutations.

   nCr, $\binom{n}{r}$, ${}_rC$ C(n,r)

   nPr, P(n,r), ${}^nP_r$

7. How does one read $\binom{10}{3}$? What is its value?

   "10 choose 3" = 120

8. Suppose you want to rearrange the letters of 'caroline' to make a puzzle. How many different sequences of these letters are possible?

$8! = 40,320$

9. There are four prizes of differing values in a raffle drawing with 100 tickets sold. How many different ways can you distribute the four prizes?

$100P4 = 94,109,400$

10. A math club has 15 members and they want to form a three-member committee to plan an event. In how many different ways can the committee be chosen?

$15C3 = 455$

11. A coin is flipped 12 times. In how many different ways can the coin come up heads 5 times?

$\frac{12C5}{2^{12}} = \frac{792}{4096} = .1933 \approx 19.3\%$

12. Sometimes it's necessary not just to count the number of permutations and combinations, but to actually list them all. You might find this site helpful. http://www.mathsisfun.com/combinatorics/combinations-permutations-calculator.html Choose a list of elements and a certain size subset of them, and either permutations and combinations. Copy or print the list of elements it produces.