Math 1312 – TTh class Test IV review
Not Complete yet – but this should be enough to get you started

9. Factorials:
   Simplify – write down the formulas and then give me the final value.

   1) \( \frac{300!}{2998!} \)  
   b) \( P(5000, 2) = \) ____________  
   c) \( C(3000, 2998) = \) __________

10. Which is larger

   a) \( P(n, r) \) or \( C(n, r) \)  
   b) 0! or 1!

11. Multiplication Principle
   a) How many two digit numbers can be created using \( \{1, 2, 3, 4, 5\} \) so that the number is an even number

      1) if repetitions are allowed ____________

      What is the probability that the number created at random will be an even number? __________

      2) if repetitions are not allowed ____________

      What is the prob. that the number created will be an even number? __________

   b) A company is to select three different representatives to send to three different conventions during the year. Forty-two people volunteer to attend. How many different groups of three can be selected? __________

c) Three movies are to shown at a local theater. The movies will be selected in the following format;

   The first movie will chosen from a group of six G-rated movies. The second movie will be selected from a group of five PG rated movies. The last movie selected will come from any one of seven unrated movies.

   How many different groups of movies can be shown? _______________
11. Simple permutations and Combinations

a) A company has two openings in its accounting department. A total of twenty applicants are interviewed for the job. Eight of the applicants are female.

How many different ways can the company fill the two openings if anybody can be chosen? __________

How many ways if at least one must be female? __________

What is the probability that exactly one is a female? ______________

b) A family drives to the local shop to pick up a fresh Christmas tree. The store has 20 available trees – four of these have a minor but visible defect. Once there they decide to pick up an additional two trees. If the trees are selected at random,

a) how many different groups of trees could be selected? __________

b) how many groups of trees with only one defective tree? ______________

c) what is the probability that the group selected has only one bad tree?

12.

a) A box contains four red balls, 1 blue ball, and 5 yellow balls. You draw a ball record the outcome and replace the ball. Suppose that three balls are drawn in this manner.

What is the probability of drawing

1) all blue balls? __________

2) exactly 2 red and 1 yellow? __________

b) If the balls are not replaced, what is the probability of drawing

1) all blue balls? __________

2) exactly 2 red and 1 yellow? __________
13. A Bernoulli Experiment consists of how many outcomes? _________
   What are they called?

   If a Bernoulli Experiment is repeated n times (n-independent trials), then what do we call the experiment?

14. What is the formula that we called the Binomial formula – (this means give me the formula!)

15. Simplify \[ C(40, 2)(0.2)^2(0.8)^{38} = \] ___________

16. Every time a ship leaves the harbor during a storm, there is a 2% that the ship will sink. Last week twenty ships left the harbor during a storm. What is the probability that

   a) exactly 7 of the ships will sink? ___________   
   b) at least one will sink? __________

   If an experiment can be classified an a binomial experiment, we can find the expected value \( \mu = E(X) \) by

   \[ \mu = np \]   and   \[ \sigma^2 = npq. \]

   If the experiment above (#16) is a binomial experiment,

   define the random variable \( x \), define success, find success probability, and finish by finding the expected value and the variance.

17. Find the expected value of the random variable that has the following probability distribution.

   \[
   \begin{array}{c|c}
   X=x & P(X=x) \\
   \hline
   -2 & 1/7 \\
   0 & 2/7 \\
   1 & 4/7 \\
   \end{array}
   \]
18. Find the variance and standard deviation of X in the problem above.

19. A child has 26 blocks. Each of the blocks corresponds to one letter of the alphabet.
    Selects three blocks and holds them together in his hands.
    a) How many three letter “words” are possible? _______ (Assume that any of the 26 can be selected)
    b) How many different groups of three blocks can be selected? ________

20. A class consists of 10 people. Three different individuals are selected. If the class consists of 4 male and three female. What is the probability that the group consists of two male and 1 female member?

21. On three different days a person will be chosen at random to lead the group. What is the probability that the selection will consists of exactly two male selections?

22. Find $P(2000, 2) =$ ______________ $\quad P(n, n) =$ ______________

$C(2000, 1999) =$ ______________ $\quad 0! =$ ______________
24-26  Questions about conditional probability – formula, word problems

27. Baye’s Formula

28-30.  Questions about independent events – exclusive events and probability

31.  Some basic questions about probability and properties of it.