Mathematics 174 Test #3

Name: _____

Show your work to get credit. An answer with no work will not get credit.

1. (20 points) Evaluate the following.

   (a) $\binom{10}{6}$

   _____

   (b) $5!$

   _____

   (c) $P(7,4)$

   _____

   (d) $(x-2)^4$

   _____

2. (10 points)

   (a) How many PIN's of length 6 can be made from the ten digits $\{0,1,2,3,4,5,6,7,8,9\}$?

   _____

   (b) How many PIN's of length 6 can be made from the ten digits $\{0,1,2,3,4,5,6,7,8,9\}$ if no digit is repeated?

   _____

3. (5 points) In a class of 30 students 10 are selected to go on a field trip. How many ways can the 10 students be chosen?

4. (10 points) An urn contains one blue ball and two red balls. A second urn contains two blue balls and one red ball. An experiment is performed where one of the two urns is chosen at random and then two balls are chosen from it, one after the other without replacement.
   (a) Construct the possibility tree for all the outcomes of this experiment.

   (b) If all the outcomes are equally likely, then what is the probably of choosing exactly one red ball?

5. (10 points) Peter and Paul play play series of games where in each of the games one of them wins a point. The first to win 21 games wins the series. How many ways can Paul win the series in exactly 31 games?

_____

6. (10 points) A bakery produces 5 types of bagels.
   (a) How many different selections of 12 bagels are there?

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   (b) Hom many different selections of 12 bagels are there if exactly three must be onion bagels?

_____

7. (10 points) A sequence is defined recursively by $a_k = ka_{k-1} - 3a_{k-2} + 2$, $a_0 = 1$, $a_1 = -1$. Find the next three terms in the sequence.

8. (10 points) Solve the following recursion. $b_k = b_{k-1} + 4$, $b_0 = -3$.

$$b_n = \underline{\hspace{5cm}}$$

9. (10 points) Solve the following second order recursion relation $c_k = c_{k-1} + 6c_{k-2}$ with initial conditions $c_0 = 1$, $c_1 = 4$.

$$c_n = \underline{\hspace{5cm}}$$

10. (5 points) A can box contains 12 bagels, of which 7 have garlic on them and 9 have onion. If every bagel has either onion, garlic or both, then how many have both garlic and onion?