

**Mathematics 174 Test #3**

Name: \_\_\_\_\_

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

(1) (5 Points) Evaluate the following.

(a)  $\binom{12}{8}$

\_\_\_\_\_

(b)  $P(9, 4)$

\_\_\_\_\_

(2) (10 Points) Let  $A = \{c, d, f, g\}$ ,  $B = \{f, j\}$ , and  $C = \{d, g\}$ . The find the following

(a)  $A \cap B$

\_\_\_\_\_

(b)  $(A - B) \cup C$

\_\_\_\_\_

(3) (10 Points)

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

\_\_\_\_\_

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

\_\_\_\_\_

(4) (15 Points)

(a) Draw the Venn diagram for  $(A \cup B) \cap C$

(b) Draw the Venn diagram for  $(A \cap B) \cup C$

(c) Is  $(A \cup B) \cap C \subseteq (A \cap B) \cup C$ ? Explain your answer in terms of the Venn diagrams you have drawn.

(5) (10 points) A coin is tossed 3 times and for each toss the result ( $H$  for heads or  $T$  for tails) is recorded.

(a) What is the sample space for this experiment?

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(b) Assuming all outcomes are equally likely what is the probability for getting exactly 2 heads?

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(6) (10 Points) A coin is tossed 12 times and for each toss the result ( $H$  for heads or  $T$  for tails) is recorded.

(a) What is the total number of possible outcomes? \_\_\_\_\_

(b) What is the number of outcomes that have exactly 7 heads? \_\_\_\_\_

(c) Assuming all outcomes are equally likely what is the probability for getting exactly 7 heads? \_\_\_\_\_

(7) (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 probability of choosing exactly one blue ball? \_\_\_\_\_

(8) (5 Points)

(a) How many integers are there from 400 to 999? \_\_\_\_\_

(b) How many of the integers from 400 to 999 are odd? \_\_\_\_\_

(9) (5 Points) A bit string is a string of 0's and 1's How many bit strings are there with length from 2 to 5? \_\_\_\_\_

(10) (15 Points) A class of size 20 contains 8 men and 12 women. A study group of 6 students is formed.

(a) How many ways can the study group be formed? \_\_\_\_\_

(b) How many ways can the study group be formed to have 2 men and 4 women? \_\_\_\_\_

(c) If the class contains a couple that has to work together (so that they are either both in the study group, or both not in the group) then how many ways can the group be formed? \_\_\_\_\_

(11) (5 Points) How many distinguishable arrangements can be made from the letters AABBBCCCC?

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