MATH 103 - Test #2 - 10/20/00

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Points in [brackets] total 100. ***Show all work for full credit. Short answer questions should be answered in full sentences*** **The following formulas may be used as needed:**

$$P_{n,r} = \frac{n!}{(n-r)!} \qquad C_{n,r} = \frac{n!}{r!(n-r)!}$$

1. Suppose in a certain election 55% of the voters prefer Betty Rubble over Fred Flintstone. This implies that if you pick a voter "at random" (i.e., in a fair draw) the probability they prefer Rubble is .55 .

a. What is the probability a voter prefers Flintstone? (Assume everyone prefers either one candidate or the other.)

[5]

b. What are the *odds* for a voter preferring Rubble?

[5]

c. What are the *odds* for a voter preferring Flintstone?

[5]

d. If you choose 200 voters at random, how many of them do you expect to prefer Rubble?

[5]

e. Suppose that last week the race was a tie. At that time, what were the odds for picking a voter who preferred Rubble?

[5]

2. Consider a board game where you roll a pair of fair four-sided dice. The faces of each die are numbered 1 through 4.

[20]

a. How many different ways are there to roll the dice? (HINT: Use the Basic Counting Law.)

b. You play the game by moving according to the sum of the two dice. Complete the following table showing all the sums that may be rolled.

Possible Sums on Pair of Four-Sided Dice

2nd Roll / 1st Roll	1	2	3	4
1	2			
2				
3				
4				8

c. What is the probability that the sum is at least 6?

d. What is the probability that the sum is an odd number?

3. A city decides to consolidate its five high schools into two brand new schools. Each school must choose their school colors. A sports uniform company provides a list of 15 possible colors. Each school is to choose 2 of these colors.

[20]

a. In how many ways can a school choose its colors from the list provided?

b. Explain in detail why you chose the method used in (a).

c. If the two schools do not consult with each other, what is the probability that they both choose the same two colors?

4. Evaluate the following. **Show all work!**

[5] a. $P_{20,15}$

[5] b. $C_{50,4}$

[5] c. 8!

5. In the game *Super Master Mind* a player chooses 5 pegs and lines them up in a row. There are 8 colors to choose from and each color can be used as many times as desired. Note that the following examples represent two different sequences.

[20]

1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}
BLUE	RED	GREEN	RED	BLUE
RED	BLUE	GREEN	BLUE	RED

a. In how many ways can a sequence of 5 pegs be chosen?

b. The opponent then tries to guess the colors in the same exact order. If a person is guessing what is the probability they are correct on the first guess? Give both an exact answer and a rounded answer.

Exact Fractional Answer:

Rounded Answer (like 5 out of a 1000):

c. Suppose your opponent did guess correctly on the first attempt. What might you conclude? **Explain your answer!**

EXTRA CREDIT [+4]

Printed on the *Super Master Mind* game box is the statement, "Up to 59,000 permutations." The rules indicate this is possible if you are allowed to leave any of the five positions blank — essentially you are considering "Blank" as a 9^{th} possible color.

a. Show how the figure 59,000 was calculated.

b. Is the word "permutations" (printed on the game box) being used in the same way that we have been using it in class? **Explain!**