

MATH 103 - Test #2 - 4/4/03

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Show all work for full credit. Points in [brackets] total 100.  
You may use the following formulas as needed.

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

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

$$E.V. = \sum p_i x_i$$

1. For a fair coin, the probability of tossing heads is 50%. Explain what this says about outcomes when tossing the coin. (Your explanation should include a formal description of what “probability” means.)

[8]

2. Explain the difference between a *theoretical* and an *experimental* probability.

[7]

3. A pair of fair, six-sided dice is rolled and the two numbers are added together. What is the probability that you will roll a sum of 3?

[10]

4. The probability of rain tonight is 50%. What are the *odds* that it will rain?

[10]

5. The odds for a team winning a game are listed as 5:2.

a. Explain what these numbers mean in terms of winning and losing.  
[7]

b. What is the *probability* for the team winning?  
[8]

6. A child is being given a memory test. The tester has a set of 6 blocks, each of a different color. The blocks are stacked up in a tower and the child is given one minute to study them. The blocks are knocked down and the child is asked to stack them up in the same order as before. Suppose the child is able to do this correctly; explain why this would provide good evidence of a well-developed memory. **For full credit include specific calculations to support your answer.**  
[10]

7. A student is given a quiz containing 10 true/false questions.

a. Assuming all the questions must be answered with either TRUE or FALSE, how many different ways could the student complete the answer sheet? (For example, answering TRUE to all the questions is one possible way.)  
[10]

b. **EXTRA CREDIT [+4]** If a student is simply guessing the answers (say, by flipping a coin) what is the probability they answer exactly nine out the ten questions correctly?

8. For a game of chance you are told that the *expected value* is \$1. Explain what this means. (Your explanation should include a formal description of what “expected value” means.)  
[5]

9. In a carnival game you a throw a dart at a dartboard and win a certain amount depending on where the dart lands. The amount won is listed below along with the associated probability.

Amount Won	\$0	\$1	\$5	\$10
Probability	.80	.15	.04	.01

- a. What is the *expected* amount won per play of the game?  
[10]

- b. Suppose the games costs 50 cents to play. How much profit (or loss) should the carnival expect to have after 100 people have played?  
[5]

10. There are 41 people in our class. A group of five people are to be selected to lead a discussion on how statistics is used in everyday life. How many possible ways are there to choose the group of five?  
[10]