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| MA 110-06 Ch. 1-4 | Final Exam | score | Name: _____ 11 December 2001 |
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1. Use a properly labeled Venn diagram to determine the validity of the following argument. Explain. (6 points)

1. All secretaries are women.
2. My uncle is a secretary.

Therefore my uncle is a woman.

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2. Use truth tables to show that the symbolic statement $p \rightarrow q$ is logically equivalent to its contrapositive. (6 points)

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3. Convert the following argument into symbolic form and determine if the argument is valid using a truth table. (7 points)

All lawyers are in Florida. You are in Florida only if you like the Sun. You do not like the Sun. Therefore, you are not a lawyer.

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4. For the given sets, find $A \cap B$; then find $(A' \cap B)'$. (6 points)

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$$

$$A = \{1, 4, 7, 10, 13\}$$

$$B = \{1, 2, 3, 4, 5, 6\}$$

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5. In a survey of 250 students, 100 report that they enjoy mathematics, 76 report that they enjoy statistics, and 124 report that they enjoy neither mathematics nor statistics (but they greatly admire students who do enjoy mathematics and statistics). How many in the survey enjoy both mathematics and statistics?

Draw and label a Venn diagram and explain your reasoning. (6 points)

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6. In how many ways can a president, vice president, and treasurer be selected from a group of 21 people (assuming no one can serve in two offices)? Explain your counting argument. (6 points)

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7. From a group of 6 men and 7 women, how many different ways are there to choose a 5-person committee consisting of at least 2 women and at least 2 men? Explain your counting argument. (6 points)

8. How many different 5-card poker hands four cards from the same kind? Explain. (6 points)

9. Three dice are rolled. What is the probability that the sum of all the dice is 5? Explain your reasoning. (6 points)

10. There are 5 red marbles and 8 green marbles in a box. Three marbles are selected (without replacement) at random. What is the probability all three are green? (6 points)

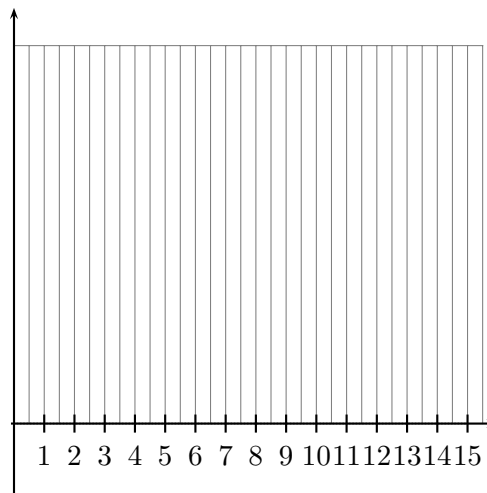
11. Two dice are rolled. One die is red and the other is green. Let A denote the event that the sum of the two dice is 7. Let B denote the event that the red die is a 1. Determine if A and B are independent. Would the answer be different if in event A the sum were a 6 rather than a 7? Explain. (6 points)

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12. You play a game with one opponent where you flip an unfair coin. The coin lands on heads with probability 0.4 and on tails with probability 0.6. When the outcome is heads, you pay your opponent \$3, and when the outcome is tails, your opponent pays you \$5. What are your expected winnings per game? (6 points)

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13. A survey of 600 people was taken that asked the question “Is there too much violence on TV?” The responses received are summarized in the table. Find the probability that (a) the response is yes, given that the response is from a woman; (b) the response is from a woman, given that the response is yes; and, (c) the response is yes and is from a woman. (7 points)

| | Yes | No | Don't Know |
|-------|-----|----|------------|
| Men | 162 | 95 | 23 |
| Women | 256 | 45 | 19 |

14. Draw a *relative frequency histogram* for the dataset $\{0.9, 2.1, 2.3, 5.1, 9.3, 3.9, 7.2, 4.4, 7.8, 3.0, 7.9, 8.3, 2.1, 4.9, 6.2, 5.2, 8.9, 9.9, 1.1, 1.9, 5.2, 7.1, 11.0, 11.5, 13.2, 6.3\}$. Use 5 data groups each of width 3 starting at 0 (so that $0 \leq x < 3$ is the first group, ...). (7 points)



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15. Find the mean, median, mode, sample variance, and sample standard deviation for the dataset $\{12, 14, 13, 15, 17\}$. (7 points)

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16. A population is normally distributed with mean 22.8 and standard deviation 3.2. Find the probability that a randomly selected member of the population has value greater than 20, i.e., find $p(x > 20.0)$. (6 points)