

EXAM 4 - MATH 111

Wednesday, November 24, 2003

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Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- Let $U = \{2, 3, 4, 5, 7, 9\}$, $X = \{2, 3, 4, 5\}$, $Y = \{3, 5, 7, 9\}$ and $Z = \{2, 4, 5, 7, 9\}$. Compute the sets (a) $X \cap Y$, (b) $X' \cup Y$ and (c) $Y \cap (X' \cup Z)$.
- Human blood can contain either no antigens, the A antigen, the B antigen, or both the A and the B antigens. A third antigen, called the Rh antigen, is important in human reproduction, and again may or may not be present in an individual. Blood is called type A-positive if the individual has the A and Rh antigens, but not the antigen B. A person having only the A and B antigens is said to have type AB-negative blood. A person having only the Rh antigen has type O-positive blood. Other blood types are defined in a similar manner.

In the Soo hospital, the following data were recorded: 25 patients had the A antigen, 17 had the A and B antigens, 27 had the B antigen, 22 had the B and Rh antigens, 30 had the Rh antigen, 12 had none of the antigens, 16 had the A and Rh antigens and 15 had all three antigens. Find
 - How many patients were represented
 - How many had exactly two antigens
 - How many had O-negative blood type.
- Consider the following experiment: A fair coin is tossed. If it shows heads, then a fair die is rolled. If tails shows, the experiment is ended.
 - Write a sample space for this experiment.
 - What is the probability of the event "Tails"?
 - What is the probability of the event "An even number was rolled given that heads was tossed"?
 - What is the probability of the event "Heads was tossed and an even number was rolled"?
- Sixty students in a Detroit school were interviewed with the following results: 35 spoke Spanish, 15 spoke Chinese and 6 spoke both languages. Find the probability that a randomly selected student from this school (a) speaks neither of these languages (b) speaks only one of the two languages.
- Consider the experiment of drawing successively two cards from a well-shuffled deck without repetition. Find the probability that the second card drawn is red.
- The Soo-Coop Bank finds that the relationship between mortgage defaults and the size of the down payment is given by the following table

Down Payment (%)	10%	20%	25%
Number of mortgages of this type	300	200	100
Probability of default	0.03	0.02	0.01

What is the probability that a default will occur? If a default occurs, what is the probability that it occurred on a mortgage with a 25% down payment?