

**Mathematics 210-1, MIDTERM I, October 22, 2002**

1. (10 points) Are the statements  $(p \vee q) \longrightarrow (p \vee q)$  and  $(p \wedge q) \longrightarrow (p \vee q)$  equivalent?
2. (20 points) The events  $A$  and  $B$  are two events of a sample space with  $P(A) = .5$ ,  $P(B) = .4$ , and  $P(A \cup B) = .8$ .
  - (a) Find the odds in favor of  $A \cap B$ .
  - (b) Find  $P(A|B)$  and  $P(A|B')$ . Write the answers as fractions.
  - (c) Are the events  $A$  and  $B$  independent? Explain.
3. (10 points) Use shading to show the set  $(X' \cap Y) \cup Z$  on a Venn diagram.
4. (12 points) Two cards are drawn at random without replacement from an ordinary deck. Find the probability that at most one card is an ace. Write the answer as a fraction.
5. (12 points) Box A contains 7 white balls and 2 green balls, while box B contains 2 white and 4 green balls. A box is chosen at random and a ball is selected from it. The probability of choosing box A is  $1/6$ . Find the probability that the ball came from box B if it is green. Do not simplify!
6. (12 points) The ski club has 33 members: 18 men and 15 women. **How many** different 6-member committees can be formed, if the committee should contain at least two but not more than three women? Write the answer using factorial notation, do not simplify.
7. (12 points) Four monkeys - Sleepy, Happy, Bashful, and Doc - are available for a genetics experiment. In the experiment, three of them are to be randomly selected and arranged in a row. Find the probability that Sleepy will be last. Explain. Write the answer as a fraction.
8. (12 points) When a certain operation is performed, 70% of the patients survive. Find the probability that not all patients survive in 3 such operations. Write the answer as a decimal.