

Review Problems  
Probability Theory  
Psychology 310

**NOTE:** These problems have been produced in response for requests to a wide range of problem difficulties. These are marked according to the following characteristics:

\* Approximately at the level of difficulty expected.

\*\* Somewhat more difficult than the level expected.

\*\*\* Substantially more difficult than the level expected for the exam.

\*\*\* 1. Urn 1 contains  $x$  white and  $y$  red marbles. Urn 2 contains  $z$  white and  $v$  red marbles. A marble is chosen at random from urn 1 and put into urn 2. Then a marble is chosen at random from urn 2. What is the probability that this marble is white?

\*\* 2. A box contains 4 bad and 6 good tubes. Two are drawn out together. One of them is tested and found to be good. What is the probability that the other one is also good?

\*\*\* 3. A bag contains 3 coins, one of which has two heads, while the other two are normal. A coin is chosen at random from the bag. The coin is tossed randomly 4 times in succession. If heads turn up *each* time, what is the probability that this is the two-headed coin?

\* 4. Each of two persons tosses 3 fair coins independently and at random. What is the probability that they each obtain the same number of heads?

\*\* 5. A fair coin is tossed  $2n$  times. What is the probability that there will be an equal number of heads and tails?

\* 6. Suppose that, from  $N$  objects, we choose  $r$  at random, with replacement. What is the probability that no object is chosen more than once?

\*\* 7. Ten chips numbered 1 through 10 are mixed in a bowl. Two chips are drawn at random (without replacement) from the bowl. What is the probability that their values will sum to exactly 10?

\* 8. What is the probability of drawing a flush in five card stud poker?  
(A flush occurs when all 5 cards are of the same suit, i.e., spades, hearts, diamonds, or clubs.)

\* 9. A product is assembled in 3 stages. At the first stage there are 5 assembly lines, at the second there are 4, and at the third there are 6 assembly lines. In how many different ways may the products be routed through the assembly process?

\* 10. Whenever an experiment is performed, the occurrence of a particular event  $A$  has probability  $.2$ . The experiment is repeated until  $A$  occurs. What is the probability that it will be necessary to carry out a 4th experiment?

\* 11.  $P(A)=.5$ .  $P(B)=.6$ .  $A$  and  $B$  are independent. Find  $P(A \cup B)$ .