Math 332 Review Problems for Exam #1

IN ALL PROBLEMS WHERE THE FINAL ANSWER IS INCORRECT, PARTIAL CREDIT WILL BE GIVEN ACCORDING TO HOW MUCH WORK IS SHOWN.

1. A bag contains 225 yellow candies, 150 orange candies, and 75 red candies. Forty-five of the yellow candies, 105 of the orange candies, and 30 of the red candies are extra sweet. (Write each final answer as a fraction reduced to lowest terms.)

   (a) One candy is to be randomly selected from the bag and the following events are defined:

   E = the selected candy is extra sweet
   O = the selected candy is orange
   Y = the selected candy is yellow
   R = the selected candy is red.

   Find each of the following probabilities.

   $P(E)$ $P(O \cup R)$ $P(R \cap O)$ $P(E \cup Y)$

   $P(E \cap Y)$ $P(O')$ $P(Y|E)$ $P(E|Y)$

   (b) Are E and Y a pair of independent events? Why or why not?

   (c) Are E and R a pair of independent events? Why or why not?

2. The probability of winning anything when a quarter is dropped into a certain slot machine is 0.46. (Calculate each final answer.)

   (a) If eight quarters are dropped into the slot machine, what is the probability of winning at least once?

   (b) If eight quarters are dropped into the slot machine, what is the probability of losing at least once?

3. A committee consists of six faculty members, five administrators, and eight students. (You <u>do not</u> have to calculate a final answer for each of the following parts; just set up the answer so that it is ready for calculation.)

(a) If seven committee members are randomly selected with replacement, find the probability that exactly two are faculty members, exactly one is an administrator, and exactly four are students.

(b) If seven committee members are randomly selected without replacement, find the probability that the first and second are faculty members, the third is an administrator, and the rest are students.

(c) If seven committee members are randomly selected without replacement, find the probability that exactly two are faculty members, exactly one is an administrator, and exactly four are students.

(d) If seven committee members are randomly selected with replacement, find the probability that the first and second are faculty members, the third is an administrator, and the rest are students.

(e) If seven committee members are randomly selected without replacement, find the probability that exactly two are administrators given that exactly three are students.

(f) If seven committee members are randomly selected with replacement, find the probability that exactly three are faculty members given that at least one is a student.

(g) Successive committee members are randomly selected without replacement. Find the probability that the fifth faculty member appears on the ninth selection.

(h) Successive committee members are randomly selected with replacement. Find the probability that the fifth faculty member appears on the ninth selection.

4. In a room are 4 males and 6 females. On a porch are 8 males and 11 females. One person is randomly selected to move from the room to the porch, after which one person is then randomly selected from the porch. Find the probability that

   (a) the person selected from the porch is male. (Write the final answer as a fraction reduced to lowest terms.)

   (b) the person selected from the room is female given that the person selected from the porch is male. (Write the final answer as a fraction reduced to lowest terms.)

5. A bowl contains six $0.50 chips, three $1 chips, and one $2 chip. Two chips are to be selected and the random variable X is defined to be the sum of the dollar value of the selected chips.

   (a) Find the space of X if the selection is done without replacement.

   (b) If the selection is done without replacement, find $P(X<3)$. (Write the final answer as a fraction reduced to lowest terms.)

   (c) Find the space of X if the selection is done with replacement.

   (d) If the selection is done with replacement, find $P(X<3)$. (Write the final answer as a fraction reduced to lowest terms.)

6. Seventy-five people are randomly assigned to 54 rooms.

   (a) Find the probability that each room will contain at least one person. (You <u>do not</u> have to calculate a final answer; just set up the answer so that it is ready for calculation.)

   (b) Find the probability that at least one room will have no person assigned to it. (You <u>do not</u> have to calculate a final answer; just set up the answer so that it is ready for calculation.)

7. Suppose A is an event. Is it possible for A and A' to be independent? If not, why not? If yes, when is it possible?

8. Suppose that A, B, C are events, and $A \cap B \cap C$ is the empty set. Is it possible for A, B, C to be mutually independent events? If not, why not? If yes, when is it possible?

9. Suppose that A, B, C are mutually independent events, all of which has probability greater than zero and none of which has a probability equal one. Prove that $(A \cap C)$ and $(B \cap C)$ are not independent events.

Here are some additional practice exercises from the textbook (with answers in the back of the textbook):

1.2-1, 1.2-3, 1.2-5, 1.2-7, 1.2-11, 1.2-13, 1.2-15,

1.3-1, 1.3-3, 1.3-5, 1.3-7, 1.3-9, 1.3-11, 1.3-13, 1.3-15, 1.3-17,

1.4-1, 1.4-3, 1.4-5, 1.4-7, 1.4-9, 1.4-11, 1.4-13, 1.4-15, 1.4-17,

1.5-1, 1.5-3, 1.5-5, 1.5-7, 1.5-9, 1.5-11, 1.5-13, 1.5-15, 1.5-17,

1.6-1, 1.6-3, 1.6-5, 1.6-7, 1.6-9.