

## Group Activity 2.4: Discrete Distributions and the Binomial Distribution

1) Indicate if the following is a probability distribution. If it is, find its mean. For the following,  $x$  represents the number of missed shots, when a basketball player tries 4 free throws and  $p(x)$  is the corresponding probability.

$x$	$P(x)$
0	.35
1	.25
2	.20
3	.15
4	.05

2)a) You bet \$5 on the number 7 in roulette. If you win, you will earn \$175(net). What is your expected value? Explain what this represents. (Reminder: in roulette, the slots are 0,00, 1,2,...36. 0 and 00 are green; of the numbers 1-36, half are black and half are red.)

b) You bet \$5 that the outcome will be 'red'. If the outcome is red, you will double your money (net earnings of \$5), or else you lose the \$5. What is your expected value of earnings/losses?

3) Suppose a life insurance policy sells a \$250,000 one-year term life insurance policy to a 20 year old female for \$200. The probability that the female survives the year is .99952. Compute and interpret the expected value of this policy to the insurance company. (Hint: remember to use 'net' \$ figure for earnings and or losses.)

4) Nine percent of men can not distinguish between the colors of red and green. If six men are selected, find the probability that

a) exactly two can not distinguish between the colors of red and green

b) at least two can not distinguish between the colors of red and green.

c)at most three can not distinguish between the colors of red and green.

5) An airline has a 88% on-time record. If 10 flights are randomly selected with this airline, what is the probability that  
a) exactly 8 out of 10 are on time?

b) at least 7 flights out of 10 are on time?

6) The central intelligence agency has specialists who analyze the frequencies of letters of the alphabet in an attempt to decipher intercepted messages. In standard English text, the letter r is usually used at a rate of 7.7%.

a) Find the mean and standard deviation for the number of times the letter r will be found on a typical page of 2600 characters.

b) In an intercepted message sent to Iraq, a page of 2600 characters is found to have the letter r occurring 175 times. Is this unusual?

**7) Expected Value**

It costs \$10 to play this game: Two dice are rolled. If the sum of the dice is 12, you are given \$100. If the sum is 6, you are given \$20. In every other case, you lose the bet. Find the expected value. (Hint: make sure to consider the net earnings/losses.)

**8) Expected Value**

It costs \$5 to play this game: One card is dealt from a standard deck of 52. If the outcome is a diamond, you make \$4 (net earning), if the outcome is the ace of spades you make \$50(net earning), otherwise you lose the bet. Find the expected value.