PRACTICE PROBLEMS
DISCRETE DISTRIBUTIONS

1) In each of the following cases, name the distribution that can best be used to describe the random variable X and give the value of all necessary parameters for that distribution:

a) You have a bag of 100 M&M's. 30 are green. If you grab a handful of 10 M&M's, let X be the number of green M&M's you grab.

b) Next you ask your neighbor if they like M&M's. Assume that 70% of all people like M&M's. Let X=1 if they say yes and X=0 if they say no.

c) Again, assume that 70% of all people like M&M's. In a class of 40 students, let X be the number of students who like M&M's.

d) Suppose you have a jumbo bag of 10,000 M&M's and 500 of them are yellow. Let X be the number of yellow ones you get in a handful of 10 M&M's.

e) On average, 3 people in the U.S. are diagnosed with toxic M&M's overdose syndrome per month. Let X be the number of people diagnosed with this symptom next year.

2) A confectionery company makes chocolate chip cookies as part of their production line.Chocolate chips distributed according to a Poisson distribution with an average of 12 chocolate chips per cookie.

a) Calculate the probability that a cookie selected at random contains exactly 10 chocolate chips.

b) Calculate the probability that in 17 randomly selected cookies at least 3 have exactly 10 chocolate chips in them.

3) An urn contains 6 red balls, 6 green balls, and 3 purple balls. You randomly reach in and pull out 4 balls, one at a time with replacement. For each part, in addition to answering the question, also state the **distribution and parameters** you are using:

a) What is the probability that you draw at least 2 purple balls?

b) If you draw all 4 balls without replacement, what is the probability that you draw at least 2 purple balls?

4) Now you are dealing with a huge urn with 6000 red balls, 6000 green balls but only 3 purple balls. You return to the one-at-a-time with replacement method of drawing 400 balls. What is the probability that you draw at least 2 purple balls?

5) An oil company conducts a geological study that indicates that an exploratory oil well should have a 20% chance of striking oil. What is the probability that the first strike comes on the third well drilled?

6) It rains 3 days per month on average in California. For each part below, in addition to answering the question, also state the **distribution and parameters** you are using.

a) What is the probability that there are no rainy days next month?

b) What is the probability that there will be 4 rainless months during the next year?

c) What is the probability that there will be no rain in a 3-month period?

7) A batch of 10 rocker cover gaskets contains 4 defective gaskets. If we draw samples of size 3 without replacement, from the batch of 10, find the probability that a sample contains 2 defective gaskets.

8) A wallet contains 3 $100 bills and 5 $1 bills. You randomly choose 4 bills. What is the probability that you will choose exactly 2 $100 bills?

9) A representative from the National Football League's Marketing Division randomly selects people on a random street in Kansas City, Kansas until he finds a person who attended the last home football game. Let p, the probability that he succeeds in finding such a person, equal 0.20. And, let X denote the number of people he selects until he finds his first success. What is the probability that the marketing representative must select 4 people before he finds one who attended the last home football game?

10) A company (the producer) supplies microprocessors to a manufacturer (the consumer) of electronic equipment. The microprocessors are supplied in batches of 50. The consumer regards a batch as acceptable provided that there are not more than 5 defective microprocessors in the batch. Rather than test all of the microprocessors in the batch, 10 are selected at random and tested.

Find the probability that out of a sample of 10, d = 0, 1, 2, 3, 4, 5 are defective when there are actually 5 defective microprocessors in the batch.

11) Find the probability that a man flipping a coin gets the fourth tail on the ninth flip.