Examples for Chapter 4– Discrete Probability Distributions
Math 1040–1

Section 4.1

1. Determine whether each of the following variables x is discrete or continuous:

    (a) Let x represent the number of times you do laundry this month.

    (b) Let x represent your annual salary given to the nearest cent.

    (c) Let x represent a car's speed as it drives past the 3300 South exit on northbound I-15.

    (d) Let x represent your height at age 10.

    (e) Let x represent number of math classes that you have taken in your life.

2. Determine if each of the following tables represents a probability distribution:

    (a)

x	-5	6	9
$P(x)$	0.5	0.25	0.25

    (b)

x	1	2	3	4
$P(x)$	0.4	0.4	0.4	0.2

    (c)

x	1	2	3	4
$P(x)$	0.4	0.4	0.4	-0.2

3. Make a probability distribution from the following frequency distribution represent the number of fish caught in a 6-hour period:

Number of fish caught	0	1	2	3	4
Frequency	88	72	30	8	2

4. Calculate the expected value, variance, and standard deviation for each of the following probability distributions:

    (a)

x	-5	6	9
$P(x)$	0.5	0.25	0.25

    (b)

Number of fish caught	0	1	2	3	4
Probability	0.44	0.36	0.15	0.04	0.01

Section 4.2

1. When flipping a weighted coin (with the probability of heads being 0.6), what is the probability that it will come up heads exactly 5 times when it is flipped 10 times?

2. When randomly guessing on a multiple choice test with 8 questions, where each question has 4 options, what is the probability that you will get at least 7 questions correct? What is the expected number of questions a student will get correct without studying for the exam? What is the standard deviation?

Section 4.3

1. Bitter pit is a disease of apples resulting in a soggy core, caused by either overwatering or a calcium deficiency in the soil. Approximately 3.6% of all (untreated) Jonathan apples had bitter pit in a study conducted by the botanists Ratkowsky and Martin (*Australian Journal of Agricultural Research*, Vol. 25, pp. 783–790). Let x represent the first Jonathan apple chosen at random that has bitter pit.

   (a) What is the probability that the first two apples chosen do not have bitter pit, and the third one does?

   (b) What is the probability that the first three apples chosen do not have bitter pit?

   (c) What is the average number of apples that you need to pick until you find one with bitter pit? (include the one with bitter pit)

2. According to the National Conference on Bar Examiners, about 57% of all people who take the state bar exam pass. Bob is a recent law school graduate who intends to take the state bar exam.

    (a) How many times should Bob plan to take the exam?

    (b) What is the probability that Bob passes the exam either the first or second time that he takes it?

3. A certain store advertises that every one of their cashiers averages one minute per customer. What is the probability that you will be through the checkout line (and the person behind you in line will not be done) after 5 minutes if you are currently the fifth person in line?

4. Insurance agents claim that a Denver, Colorado, can expect to replace his or her roof once every 10 years due to hail damage. What is the probability that in 12 years a homeowner in Denver will need to replace the roof twice because of hail?