Problem #4.1 The mark on a statistic exam that consists of 100 multiple-choice questions is a random variable.

a. What are the possible values of this random variable
b. Are the values countable? Explain.
c. Is there a finite number of values? Explain.
d. Is the random variable discrete or continuous? Explain

Problem #4.2 Determine whether each of the following is a value probability distribution.

a.	x	5	-6	10	0
	P(x)	.01	.01	.01	.97
b.	x	0	1	2	3
	P(x)	.1	.3	.4	.1
c.	x	14	12	-7	13
	P(x)	.25	.46	.04	.24

Problem # 4.3 Probability Distribution of the Number of Color Televisions
The *Statistical Abstract of the United States* is published annually. It contains a wide variety of information based on the census as well as other sources. The objective is to provide information about a variety of different aspects of the lives of the country's residents. One of the questions asks households to report the number of color televisions in the household. The following table summarizes the data. Develop the probability distribution of the random variable defined as the number of color televisions per household.

Source: *Statistical Abstract of the United States*, 2000, Table 1221

Number of Color Televisions	**Number of Households (thousands)**
0	1,218
1	32,379
2	37,961
3	19,387
4	7,714
5	2,842
Total	101,501

a. What is the probability of a household owning 3 color-televisions?
b. Are the events mutually exclusive?
c. What is the probability of a household owning 2 or more color televisions?

Problem #4.4 Describing the Population of the Number of Color Televisions. Find the mean, variance, and standard deviation for the population of the number of color televisions per household in Problem #4.3.

Number of Color Televisions X	P(x) or f(x)	x-μ	$(x-\mu)^2 f(x)$
0	0.012		
1	0.319		
2	0.374	-0.084	0.003
3	0.191		
4	0.076	1.916	0.279
5	0.028	2.916	0.238
Total	1		

Problem #4.5 The recent census in a large county revealed the following probability distribution for the number of children under 18 per household.

Number of Children	**0**	**1**	**2**	3	4	5
Number of Households	24,750	37,950	59,400	29,700	9,900	3,300

a. Develop the probability distribution of X, the number of children under 18 per household.

b. Determine the following probabilities:

(i) P(X=< 2)
(ii) P(X>2)
(iii) P(X=>4)

Problem # 4.6 The number of pizzas delivered to university students each month is a random variable with the following probability distribution.

x	0	1	2	3
P(x)	.1	.3	.4	.2

a. Find the probability that a student has received delivery of two or more pizzas this month.
b. Determine the mean and variance of the number of pizzas delivered to students each month.

Problem #4.7 If the pizzeria makes a profit of $3 per pizza, determine the mean of the profits per student.

Problem #4.8 The probability that a university graduate will be offered no jobs within a month of graduation is estimated to be 5%. The probability of receiving one, two or three job offers has similarly been estimated to be 43%, 31%, and 21%, respectively.
Determine the following probabilities.
a. A graduate is offered fewer than two jobs.
b. A graduate is offered more than one job.

Problem # 4.9 A university librarian produced the following probability distribution of the number of times a student walks into the library over the period of a semester.

x	0	5	10	15	20	25	30	40	50	75	100
P(x)	.22	.29	.12	.09	.08	.05	.04	.04	.03	.03	.01

Find the following probabilities.

a. P(X >= 20
b. P(X = 60)
c. P(X > 50)
d. P(X > 100)

Problem #4.10-A gambler believes that a strategy called "doubling up" is an effective way to gamble. The method requires the gambler to double the stake after each loss. Thus, if the initial bet is $1, after losing he will double the bet until he wins. After a win, he resorts back to a $1 bet. The result is that he will net $1 for every win. The problem, however, is that he will eventually run out of money or bump up against the table limit. Suppose that for a certain game the probability of winning is .5 and that losing 6 n a row will result in bankrupting the gambler. Find the probability of losing six times in a row.

Problem #4.12 Use a probability tree to compute the probability of the following events when flipping two faire coins.

a. Heads on the first coin and heads on the second coin
b. Heads on the first coin and tails on the second coin
c. Tails on the first coin and heads on the second coin
d. Tails on the first coin and tails on the second coin

Problem # 4.13- Refer to Problem # 4.12

Find the following probabilities.

a. No heads
b. One head
c. Two heads
d. At least one head

Binomial Probability Distributions

Problem # 4.14 Given a binomial random variable with n= 10 and p=.3, use the formula to find the following probabilities.

a. P (X=3)
b. P(X =5)
c. P (X=8)

Problem # 4.15 Pat Statsdud is a student taking a statistics course. Unfortunately, Pat does not print the workbook before class, does not do practice problems, and regularly misses class. Pat intends to rely on luck to pass the next quiz. The quiz consists of 10 multiple-choice questions. Each question has five possible answers, only one of which is correct. Pat plans to guess the answer to each question.

a. What is the probability that Pat gets no answers correct?
b. What is the probability that Pat gets two answers correct?
N=10, p=.2 and x=2:

Problem # 4.16 Will Pat fail the quiz? Find the probability that Pat fails the quiz. A mark is considered a failure if it is less than 50%.

Problem # 4.17A sign on the gas pumps of a chain of gasoline stations encourages customers to have their oil checked, claiming that one out of four cars needs to have oil added. If this is true, what is the probability of the following events?

a. One out of the next four cars needs oil
b. Two out of the next eight cars need oil
c. Three out of the next twelve cars need oil

Problem # 4.18 The leading brand of dishwasher detergent has a 30% market share. A sample of 20 dishwasher detergent customers was taken. What is the probability that 9 or more customers chose the leading brand?

Problem # 4.19 According to the American Academy of Cosmetic Dentistry, 75% of adults believe that an unattractive smile hurts career success. Suppose that 15 adults are randomly selected. What is the probability that more than 10 of them would agree with the claim?

Problem # 4.20 In the game of blackjack as played in casinos in Las Vegas, Atlantic City, Niagara Falls, as well as many other cities, the dealer has the advantage. Most players do not play very well. As a result, the probability that the average layer wins a hand is about 45%. Find the probability that an average player wins.

Problem # 4.21 Pat Statsdud has been cloned! Suppose that a professor had a class full of students like Pat (a nightmare!). What is the mean mark? What is the standard deviation?

Lesson 5 - Chapter 6
Introduction to Continuous Probability Distributions

COMM215 BUSINESS STATISTICS
Instructor: Samie L.S. Ly

Problem # 5.1 P (Z < 1.50)
Problem # 5.2 P (Z < -1.59)
Problem # 5.3 P (Z < -2.30)
Problem # 5.4 P (-1.40 < Z < .60)
Problem # 5.5 P (Z < 2.03)
Problem # 5.6 P (-0.91< Z < -0.33)
Problem # 5.7 P (Z > 4.0)
Problem # 5.8 P (Z <1.55)
Problem # 5.9 Find z.02
Problem # 5.10 Find z. +045

Problem # 5.11 X is normally distributed with a mean of 100 and a standard deviation of 20. What is the probability that X is greater than 145?

Problem # 5.12 X is normally distributed with a mean of 1,000 and a standard deviation of 250. What is the probability that X lies between 800 and 1,100?

Problem # 5.13 X is normally distributed with a mean of 250 and a standard deviation of 40. What value of X does only the top 15% exceed?

Problem # 5.14-X is normally distributed with a mean of 50 and a standard deviation of 8. What value of X is such that only 8% of values are below it?

Problem # 5.15 The long-distance calls made by the employees of a company are normally distributed with a mean of 6.3 minutes and a standard deviation of 2.2 minutes. Find the probability that a call

a. Lasts between 5 and 10 minutes.
b. Lasts more than 7 minutes
c. Lasts less than 4 minutes.

d. How long do the longest 10% of calls last?

Problem # 5.16 The lifetime of light bulbs that are advertised to last for 5,000 hours are normally distributed with a mean of 5,100 hours and a standard deviation of 200 hours. What is the probability that a bulb lasts longer than the advertised figure?

Problem # 5-17 University and college students average 7.2 hours of sleep per night with a standard deviation of 40 minutes. If the amount of sleep is normally distributed, what proportion of university and college students sleep for more than 8 hours?

Problem # 5.18 How much money does a typical family of four spend at McDonald's restaurants per visit? The amount is a normally distributed random variable whose mean is $16.40 and whose standard deviation is $2.75.

a. Find the probability that a family of four spends less than $10.
b. What is the amount below which only 10% of families of four spend at McDonald's?

Problem # 5.19 The final marks in a statistics course are normally distributed with a mean of 70 and a standard deviation of 10. The professor must convert all marks to letter grades. She decides that she wants 10% A's, 30% B's, 40% C's, 15% D's, and 5% F's. Determine the cut offs for each letter grade.

Problem # 5.20 According to the Statistical Abstract of the United States (2000, Table 764) the mean family net worth of families whose head is between 35 and 44 years old is approximately $99,700. If family net worth is normally distributed with a standard deviation of $30,000, find the probability that a randomly selected family whose head is between 35 and 44 years old has a net worth greater than $150,000.

Problem # 5-21 A retailer of computing products sells a variety of computer-related products. One of his more popular products is an HP Laser Printer. The average weekly demand is 200. Lead time for a new order from the manufacturer to arrive is 1 week. If the demand for printers were constant the retailer would reorder when there were exactly 200 printers in inventory. However, the demand is a random variable. An analysis of previous weeks reveals that the weekly demand standard deviation is 30. The retailer knows that is a customer wants to buy an HP Laser Printer but he has none available he will lose that sale plus possibly additional sales. He wants the probability of running short in any week to be no more than 6%. How many HP Laser Printer should he have in stock when he reorders from the manufacturer?

Understanding the Basics: Suggested Problems from the Book.

In **Bold** are the Suggested Problems, in Green are the problems on Connect and the book.

	Chapter 5														
5.1	Two types of Random Variables	**5.01**	**5.02**	**5.03**											
5.2	Discrete Probability Distributions	**5.04**	**5.05**	**5.06**	**5.07**	5.08	**5.09**	5.10	5.11	**5.12**	**5.13**	5.14	**5.15**	**5.16**	5.17
5.3	The Binomial Distribution	**5.18**	**5.19**	**5.20**	**5.21**	**5.22**	**5.23**	**5.24**	**5.25**	**5.26**	**5.27**				
	Supplementary	**5.48**	**5.49**	**5.50**	**5.51**	**5.52**	5.53	**5.54**	5.55	**5.56**	5.57	**5.58**	5.59		

	Chapter 4																								
4.1	Probability, Sample Spaces, and Probability Models																								
4.2	Probability and Events	**4.01**	**4.02**	**4.03**	4.04	4.05	**4.06**	**4.07**																	
4.3	Some Elementary Probability Rules	**4.08**	**4.09**	**4.10**	**4.11**	**4.12**	4.13	**4.14**	4.15																
4.4	Conditional Probability and Independence	4.16	**4.17**	**4.18**	**4.19**	**4.20**	**4.21**	**4.22**	4.23	**4.24**	**4.25**	**4.26**	**4.27**	**4.28**	4.29	4.30	4.31	**4.32**	**4.33**						
	Supplementary	4.54	4.55	4.56	**4.57**	4.58	4.59	4.60	4.61	4.62	4.63	4.64	4.65	4.66	4.67	4.68	4.69	**4.70**	4.71	4.72	4.73	4.74			

This statistical workbook is compiled from the following books:

- Bruce L. Bowerman, Richard T. O'Connell Julie Aitken Schermer and James Adcock, *Business Statistics in Practice*, Second Canadian Edition, McGraw-Hill Ryerson
- McClave, J. T., Benson, G. P., & Sincich, T. (2008). *Statistics for Business and Economics.* New Jersey: Prentice Hall.
- Bowerman, B. L., O'Connell, R. T., Murphree, E., Huchendorf, S. C., & Porter, D. C. (2003). *Business statistics in practice*(pp. 728-730). New York: McGraw-Hill/Irwin.