PROBLEM # 7.1 A simple random sample of 8 employees is selected from a large firm. For the 8 employees, the number of days each was absent during the past month was found to be 0,2,4,2,1,7,3 and 2, respectively.

a. What is the point estimate for μ, the mean number of days absent for the firm's employees?
b. What is the point estimate for σ^2, the variance of the number of days absent?

PROBLEM # 7.2 During the month of July, an auto manufacturer gives its production employees a vacation period so it can tool up for the new model run. In surveying a simple random sample of 200 production workers, the personnel director finds that 38% of them plan to vacation out of state for at least one week during this period. Is this a point estimate or an interval estimate? Explain.

PROBLEM # 7.3 Differentiate between a point estimate and the interval estimate for a population parameter.

PROBLEM # 7.4 What is necessary for an interval estimate to be a confidence interval?

PROBLEM # 7.5 What role does the central limit theorem play in the construction of a confidence interval for the population mean?

PROBLEM # 7.6 In using the standard normal distribution to construct a confidence interval for the population mean, which two assumptions are necessary if the sample size is less than 30?

PROBLEM # 7.7 A simple random sample of 30 has been collected from a population for which it is known that σ = 10.0. The sample mean has been calculated as 240.0. Construct and interpret the 90% and 95% confidence intervals for the population mean.

	A	B	C	D
1	**Confidence interval for the population mean,**			
2	**using the z distribution and known**			
3	**(or assumed) pop. std. deviation, sigma:**			
4				
5	Sample size, n:			30
6	Sample mean, xbar:			240.000
7	Known or assumed pop. sigma:			10.0000
8	Standard error of xbar:			1.82574
9				
10	Confidence level desired:			0.90
11	alpha = (1 - conf. level desired):			0.10
12	z value for desired conf. int.:			1.6449
13	z times standard error of xbar:			3.003
14				
15	Lower confidence limit:			236.997
16	Upper confidence limit:			243.003

	A	B	C	D
1	**Confidence interval for the population mean,**			
2	**using the z distribution and known**			
3	**(or assumed) pop. std. deviation, sigma:**			
4				
5	Sample size, n:			30
6	Sample mean, xbar:			240.000
7	Known or assumed pop. sigma:			10.0000
8	Standard error of xbar:			1.82574
9				
10	Confidence level desired:			0.95
11	alpha = (1 - conf. level desired):			0.05
12	z value for desired conf. int.:			1.9600
13	z times standard error of xbar:			3.578
14				
15	Lower confidence limit:			236.422
16	Upper confidence limit:			243.578

PROBLEM # 7.8 When the t-distribution is used in constructing a confidence interval based on a sample size of less than 30, what assumption must be made about the shape of the underlying population?

PROBLEM # 7.9 In using the t distribution table, what value of *t* would correspond to an upper-tail area of 0.025 for 19 degrees of freedom?

PROBLEM # 7.10 A consumer magazine has contacted a simple random sample of 33 owners of a certain model of automobile and asked each owner how many defects has to be corrected within the first 2 months of ownership. The average number of defects was $\bar{x}$=3.7, with a standard deviation of 1.8 defects.

a. Use the t distribution to construct a 95% confidence interval for μ = the average number of defects for this model.
b. Use the z distribution to construct a 95% confidence interval for μ = the average number of defects for this model.
c. Given that the population standard deviation is not known, which of these two confidence intervals should be used as the interval estimate for μ?

PROBLEM # 7.11 For df=25, determine the value of A that corresponds to each of the following probabilities:

a. P(t >=A)= 0.025
b. P(t=<A) = 0.10
c. P(-A =< t <= A) = 0.98

PROBLEM # 7.12 From past experience, a package-filling machine has been found to have a process standard deviation of 0.65 ounces of product weight. A simple random simple is to be selected from the machine's output for the purpose of determining the average weight of product being packed by the machine. For 95% confidence that the sample mean will not differ from the actual population mean by more than 0.1 ounces, what sample size is required?

PROBLEM # 7.13 Under what conditions is it appropriate to use the normal approximation to the binomial distribution in constructing the confidence interval for the population proportion?

PROBLEM # 7.14 It has been estimated that 48% of U.S. households headed by persons in the 35-44 age group own mutual funds. Assuming this finding to be based on a simple random sample of 1000 households headed by persons in this age group, construct a 95% confidence interval for p= the population proportion of such households that own mutual funds. Source: Investment Company Institute, Investment Company Fact Book 2008, p.72.

	A	B	C	D	E
1	**z-Estimate of a Proportion**				
2					
3	**Sample proportion**	0.48	**Confidence Interval Estimate**		
4	**Sample size**	1000	**0.480**	±	**0.031**
5	**Confidence level**	0.95	**Lower confidence limit**		**0.449**
6			**Upper confidence limit**		**0.511**

PROBLEM # 7.15 The Chevrolet dealers of a large county are conducting a study to determine the proportion of car owners in the county who are considering the purchase of a new car within the next year. If the population proportion is believed to be no more than 0.15, how many owners must be included in a simple random sample if the dealers want to be 90% confident that the maximum likely error will be no more than 0.02?

PROBLEM # 7.16 Refer to Problem 7.15, suppose that (unknown to the dealers) the actual population proportion is really 0.35. If they use their estimated value (p=< 0.15) in determining the sample size and then conduct the study, will their maximum likely error be greater than, equal to, or less than 0.02? Why?

PROBLEM # 7.17 The makers of Count Chocula breakfast cereal would like to determine, within 2 percentage points and with 99% confidence, the percentage of U.S. senior citizens who have Count Chocula for breakfast at least one a week. What sample size would you recommend?

PROBLEM # 7.18 An airline has surveyed a simple random sample of air travelers to find out whether they would be interested in paying a higher fare in order to have access to e-mail during their flight. Of the 400 travelers surveyed, 80 said e-mail access would be worth a slight extra cost. Construct a 95% confidence interval for the population proportion of air travelers who are in favor of the airline's e-mail idea.

	A	B	C	D	E
1	**z-Estimate of a Proportion**				
2					
3	**Sample proportion**	0.20	**Confidence Interval Estimate**		
4	**Sample size**	400	**0.200**	±	**0.039**
5	**Confidence level**	0.95	**Lower confidence limit**		**0.161**
6			**Upper confidence limit**		**0.239**

PROBLEM # 7.19 "In surveying a simple random sample of 1000 employed adults, we found that 450 individuals felt they were underpaid by at least $ 3,000. Based on these results, we have 95% confidence that the proportion of the population of employed adults who share this sentiment is between 0.419 and 0.481." For this summary statement, identify the

a. Point estimate of the population proportion.
b. Confidence interval estimate for the population proportion.
c. Confidence level and the confidence coefficient.

<u>**Understanding the Basics**</u>**:** Suggested Problems from the Book.

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

	Chapter 8 Confidence Interval															
8.1	z-Based Confidence Intervals for a Population Mean: s	**8.01**	**8.02**	**8.03**	**8.04**	8.05	8.06	**8.07**	**8.08**	**8.09**	**8.10**	**8.11**	**8.12**			
8.2	t-based Confidence Intervals for a Population Mean: si	**8.13**	**8.14**	**8.15**	**8.16**	**8.17**	**8.18**	**8.19**	8.20	8.21	**8.22**	**8.23**	**8.24**			
8.3	Sample Size Determination	**8.25**	**8.26**	**8.27**	**8.28**	**8.29**	8.30	**8.31**	**8.32**	8.33						
8.4	Confidence Intervals for a population proportion	**8.34**	**8.35**	**8.36**	**8.37**	**8.38**	8.39	**8.40**	8.41	8.42	**8.43**	**8.44**	**8.45**	8.46	**8.47**	**8.48**
	Supplementary	8.53	8.54	8.55	8.56	8.57	8.58									

This statistical workbook is compiled from the following books:

- Keller, G. (2012). *Statistics for management and economics*. Mason: Cengage Learning.
- McClave, J. T., Benson, G. P., & Sincich, T. (2008). *Statistics for Business and Economics*. New Jersey: Prentice Hall.
- Weiers, R. M. (2011). *Introduction to Business Statistics*. Mason: Cengage Learning.
- (GMAC), F. t. (Ed.). (2005). *GMAT -Quantitative Review.* Oxford, UK: Blackwell.

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.