

READING GUIDE AND HOMEWORK ASSIGNMENTS

Module 1: Communicating Data

Read 1.1, 1.2, 1.3, 1.4, 1.5. and 1.6

Read 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8

Homework set 1:

1.12, 1.14, 1.18, 1.24 (Classify scale as well)

2.14, 2.36, 2.142, Revised 2.177 (Use Excel to plot histogram, show mean, median and mode, up to plus and minus three standard deviation, identify outliers – see Excel demo videos for more details)

Linear regression worksheet

Define and give an example:

Descriptive statistics

Inferential statistics

What is a **population**?

What is a **sample**?

What is a **random sample** and what relation does it have to inferential statistics?

Define and give an example:

qualitative data

quantitative data

continuous

discrete

Define and give an example of the scales:

Nominal

Ordinal

interval

ratio

Define, give the formula and explain the difference between the following measures of central tendency:

Mean

median

mode

Define, give the formula (or method of finding) and explain the difference between the following measures of variability:

Minimum

Maximum

Range

Variance

standard deviation

Explain what each of the following is: Skewness, kurtosis

Define, give the formula (or method of finding) and explain the difference between the following measures of relative position:

Percentile

z-score

outliers

Explain what summation means and be able to execute **summation** Σ formulas properly

Give steps for creating each of the following:

Histogram

pie chart

scatter plot

box plot

stem leaf

Plot and hand calculate a simple linear regression.

Module 2 – Describing Populations

Read 4.1, 4.2, 4.3, 4.4

Read 5.1, 5.2, 5.3, 5.4

Homework set:

Plot the entire distribution and show mean and plus and minus 3 std on curve on graph for all homework problems.

General Discrete 4.22, 4.36, 4.114, 4.116

Binomial 4.60, 4.62 (Use Excel and plot entire distribution), 4.64

Normal 5.38, 5.40, 5.42, 5.56, 5.60

Define, give the formula (or method of finding) and explain the difference between the following :

General discrete probability distributions. (Expected value or mean, standard deviation) Insert a table with all the steps.

Binomial probability distribution (mean and standard deviation). How would you plot the entire distribution? Give instructions on when and how to use the table.

Trees (Bayesian).

Normal probability distribution (mean, variance, and standard deviation).

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Standard normal curve (mean and standard deviation).

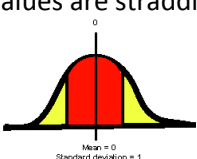
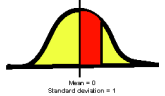


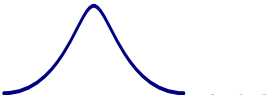
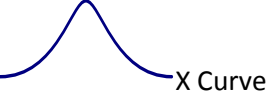
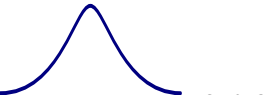

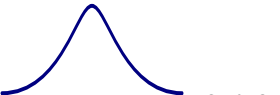
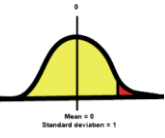
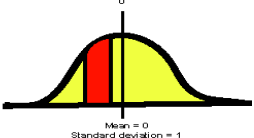

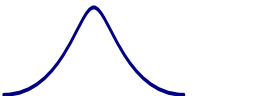
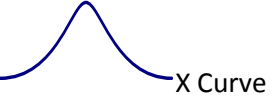
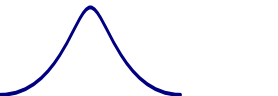

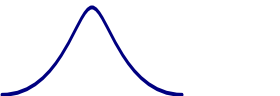
Define three ways of determining normality:

Empirical rule

Interquartile range

Normality plot (Excel)

Draw, label axis, and explain how you would use the z-table to go from an x value to the standard normal curve to probability.
 Also, explain how you would go from probability to x value.

<p>Values are straddle mean</p>  <p>Mean = 0 Standard deviation = 1</p>	 <p>Mean = 0 Standard deviation = 1</p> <p>Probability from value (right) to mean</p>	 <p>Mean = 0 Standard deviation = 1</p> <p>Values are both on left side of mean</p>
 <p>X Curve</p>  <p>z curve</p> <p>Z Table</p> <p>Probability</p>	 <p>X Curve</p>  <p>z curve</p> <p>Z Table</p> <p>Probability</p>	 <p>X Curve</p>  <p>z curve</p> <p>Z Table</p> <p>Probability</p>
<p>Value in upper tail</p>  <p>Mean = 0 Standard deviation = 1</p>	<p>Value in lower tail</p>	 <p>Mean = 0 Standard deviation = 1</p> <p>Values that are on one side of mean</p>
 <p>X Curve</p>  <p>z curve</p> <p>Z Table</p> <p>Probability</p>	 <p>X Curve</p>  <p>z curve</p> <p>Z Table</p> <p>Probability</p>	 <p>X Curve</p>  <p>z curve</p> <p>Z Table</p> <p>Probability</p>

Module 3 Estimation

Read 6.1, 6.2, 6.3

7.1, 7.2, 7.3, 7.4, 7.5

Homework set:

Central Limit 6.34, 6.38, 6.58, 6.64

Large 7.16, 7.18, 7.22,

Small 7.36, 7.38, 7.39 (Use Excel to do 7.39)

Prop. 7.50, 7.54, 7.56

Sample size 7.70, 7.72, 7.74, 7.78

Define central limit theorem. What is the relationship between the population curve and the sample means curve?

What is standard error?

Explain what a t distribution is and when you use it. Explain how it is different from the z distribution. Be sure that you can go from x to probability on the t table and vice versa.

Define confidence level and alpha. How do you go from alpha to confidence level? How do you go from confidence level to alpha?

What is a confidence interval? (Make sure that you really understand how it is used for estimation and its limitations.)

What determines the size of the confidence interval?

What determines the accuracy of the confidence interval?

Define margin of error. How can you reduce margin of error at the same confidence level?

Define sampling error.

Confidence Interval (Do problems 7.90, 7.92, 7.94, 7.99, 7.103, 7.104, 7.108 as test review)

Write the criteria for identifying each of the three cases and the formulas each case. Make sure that you know the difference between when you would use each case.

Criteria	Criteria	Criteria
Formula	Formula	Formula
Formula for sample size	Formula for sample size	Formula for sample size

Write step-by-step directions as to how you find the confidence level z or t for each case. Explain the role of alpha in the confidence level.

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Write the three elements necessary in the interpretation of the results	Fill in the confidence level and the z for the following: Alpha Confidence Level Z	Draw the 80%, 90%, 95% and 99% confidence curves.
1.	.01	
2.	.02	
3.	.05	
	.1	
	.2	

Module 4 – Are they different - Hypothesis testing

Read

One population 8.1, 8.2, 8.3, 8.4, 8.5.

Two populations 9.1, 9.2, 9.3, 9.4, 9.5

More than two populations 10.1, 10.2

Draw the curve and do the p-value for all problems:

One population

Large 8.32, 8.34, 8.46 Small 8.64, 8.68. Prop 8.80, 8.84.8.86

Two population

Pooled Variance 9.14, 9.20 (Use Excel to do 9.20), 9.28

Paired 9.42, 9.46 (Use Excel to do 9.26)

Prop 9.58, 9.62, 9.66

ANOVA More than two populations 10.32, 10.34 (Use Excel to do both)

Define the following:

Null hypothesis.

Alternate hypothesis.

Alpha of significance level

One-tail test (Draw the null hypothesis curve)

Two-tail test (Draw the null hypothesis curve)

Critical t or z and the rejection area

p-value

Give the steps to hypothesis testing:

ONE POPULATION - Write the criteria for identifying each of the three cases and the formulas each case		
Criteria	Criteria	Criteria
Formula	Formula	Formula
Write step-by-step directions as to how you find the critical value and the p-value.		
Write the three elements necessary to interpret the results	Fill in the z for the following: Alpha One-tail Z Two-tail Z	Draw the null hypothesis for a one-tail test at .05 significance including critical z.
1.	.01	
2.	.02	
3.	.05	Draw the null hypothesis for a two-tail test at .05 significance including critical z.
	.1	

Hypothesis Testing for One Population Test Review - Do problems 8.130, 8.131, 8.135, 8.138, 8.139, 8.144, 8.145 In all cases do the complete hypothesis testing procedure, draw the curve and find the p-value even if the question does not ask for it.

TWO POPULATIONS - Write all possible null and alternate hypothesis and draw the curve			
Upper tail Ho: Ha: Curve	Lower tail Ho: Ha: Curve	Two tail Ho: Ha: Curve	What change in Ho and Ha do you need for population proportion?
Write the criteria for identifying each of the four cases and the formulas each case			
Criteria Test	Criteria Test	Criteria Test	Criteria Test
Write the formulae for calculating the confidence interval of the difference			
n	n	n	n
Write the three elements necessary to interpret the results 1. 2. 3.	Fill in the z for the following: Alpha One-tail Z Two-tail Z .01 .02 .05 .1	Write step-by-step directions as to how you find the critical value and the p-value.	

MORE THAN TWO MEANS – ANOVA

What is ANOVA?

What conditions must be satisfied to use this statistical tool?

Define and write the formulas for:

Sum of Squares for Treatments

Mean Square for Treatments

Mean Square for Error

F statistic (How would you draw your conclusions on whether the means were different or not?)

Fill in the following table:

Source	df	SS	MS	F	p-value
Treatments					
Error					
Total					

Module 5 – Multiple Regression and Chi Square

Read 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8

12.1, 12.2, 12.3, 12.4

Homework Set: 11.56, 11.58, 11.60 (Use Excel)

13.24, 13.26, 13.28

Define the following and give the formulas where applicable:

Dependent variable. (Explain and show plot)

Independent variable. (Explain and show plot)

Intercept (Give simple linear formula and show plot)

How do you test the intercept?

Slope (Give simple linear formula and show plot)

How do you test the slope? What does this have to do with the validity of the regression model?

Multiple Regression formula with legend to variables

Residual

Correlation (Simple linear formula) What is the range of values?

R square (Simple linear formula) What is the range of values?

Adjusted R square. How is this different from the R square.

Point Prediction (Give steps on how you would do this.)

Prediction interval (Give formula)

Confidence interval (Give formula). Describe how this is different from the prediction interval.

Four assumptions that must be satisfied when using a regression model.

Outlier removal (Give steps on how you would do this.)

Looking at a simple linear regression allows you to understand the math in creating a regression model. Fill in the following table for the regression analysis (notice it is the same as the ANOVA table). How would you interpret whether the regression was valid or not?

Source	df	SS	MS	F	p-value
Regression					
Residual Error					
Total					

When would you use Chi Square to analyze data?

Define the following for Chi Square:

Contingency table

Null hypothesis

Alternate hypothesis

Observed frequency

Expected frequency (How is this calculated?)

Test statistic (give the formula for two factors)

How would you find the Critical Chi Square and rejection area?