SFS Handbook

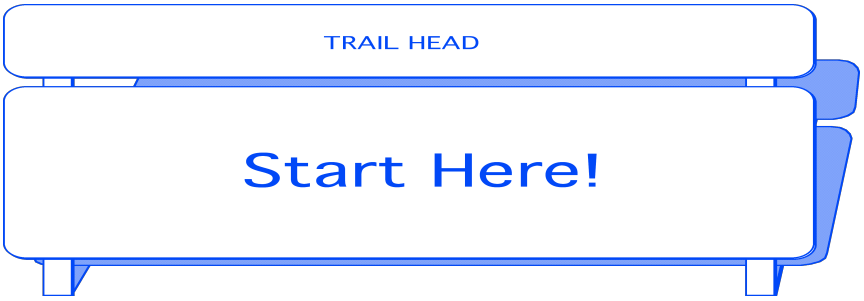
Fall 2010

Contents

PSY 3204, FALL 2010
Professor Thomas Sanocki
University of South Florida

Fall 2010 Schedule

	Week (Monday Date)	Topics	Reading	Exams
1	8/23	Problem solving with data, Analyzing scores	Start, 1, 2	
2	8/30	Science, Central tendency, IV Effect, Error, frequency	3	
3	9/6	[LDay Holiday] Standard Deviation (SD), Populations, Standard Scores;	4	
4	9/13	Standard Error, Sampling distributions, Interaction	5	
5	9/20	More science; first and easiest exam on Wednesday >>		#1 9/22
6	9/27	Testing for nothingness?!! (a.k.a., chance)	6	
7	10/04	*t*-test	7	
8	10/11	Decisions: Power, effect size, and errors	7 to p. 85 middle	#2 10/13
9	10/18	Experimental Design, Repeated measures t-test, ANOVA (*if not caught up now you are lost!!*)	p.85-6, 8	
10	10/25	ANOVA One-Way: Multiple Groups; ANOVA 2-Way	8 & 9	
11	11/1	ANOVA MULTI-FACTOR: Multiple IV's	10	
12	11/8	Interaction, Working with 2 X 2's [VD]	10	#3 11/10
13	11/15	EXAM MON., Regression & correlation: Using uniqueness	11	
14	11/22	Reg & Corr. cont., Perspective: Which statistic? [Thkg]	11, 13	
15	11/29	Chi-square, Interaction revisited	12	#4 12/1 12:55
	Final (12/1)	Partly cumulative Final, Wed. 12/1 12:55		



Statistics is a set of tools for learning about the world and behavior. The goal of this course is to gain a basic understanding of what statistics are and how they can be used.

Statistics is a scary subject for many students, but it doesn't have to be. Mathematics should not be a challenge in this course because only very basic math is required (i.e., add, subtract, simple multiplication, division, squares). Exam problems will have simple math. Most of the difficulty of statistics is that they are so strange, so counterintuitive. This makes them difficult to remember. They are unlike anything you've seen or done, and this makes it difficult to connect them with anything in your brain. Thus, statistics "go right through." However, you have a big advantage in this course — you. This course is designed to help you make statistics meaningful, so they will stay in your memory. There is one crucial ingredient — your effort. You must work to make statistics familiar and understandable in your own mind. Use this Handbook to help you in the process. See the Preface to *SFS* for more discussion of learning statistics. Consult the *SFS* Appendix if you have difficult with anxiety or test taking, and take advantage of your USF Counseling Center if these problems are significant.

The Trail Ahead

Learning statistics is like climbing mountains — effort is necessary. You will get some great "views" (new perspectives, understanding) at the top. But if you don't master the early topics, you won't make it. To make it to the mountain tops, you need the basic concepts that are provided in the first part of this course.

The first "mountain" is the basic concept of statistical inference and the *t*-test. Along the way up, you need to learn some basics about experimentation, descriptive statistics, and thinking about distributions. If you master these topics, you will find "bridges" at the top that make the next topics easy to conquer.

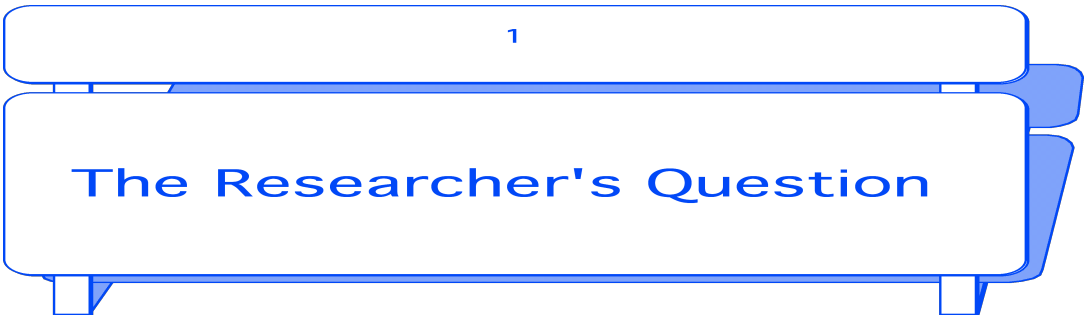
Get Provisions First

Mountain climbing requires lot's of energy and so does statistics. Nourish your mind and body with good food, and exercise to stave off tension. The homeworks and *SFS* interactive exercises will provide many opportunities to succeed and get a positive start on the trail.

If reading small type hurts your eyes, an essential aid will be inexpensive pair reading glasses to magnify the small print in your textbook.

Happy trails!

TS



WEEK 1: Introductory Concepts

Weekly Learning Goals

Learn about how statistics are used with examples.
Additional lecture material will cover problem solving and science,
and scales of measurement.

Read

"Start Here" (Preface)

Chapter 1

Homework / Lab assignment #1 (3 parts, a - c)

(HAND IN BY START OF NEXT LAB.)

a) Exercises 1.1 - 8 (Exercises 1 through 8, Chapter 1 of SFS)

b)Answer Ch. 1 Review questions (SFS end of chapter)

c) Generate 3 experiments (think them up). For each, describe briefly by writing (a) a sentence saying what it is about, (b) state the IV, and (c) state the DV.

Turn in the exercises together with your brief descriptions, by start of next week's lab.
At lab start, lab Instructors will review correct answers so you can self-correct homework.

WEEK 2: Important foundational concepts of IV and Error

Goals

Operational definitions,
Calculating means (brief introduction),
and MOST IMPORTANT…
The idea of dividing up individual scores from an experiment into their two parts
— IV Effect and Error

Read

Review Chapter 1
Chapter 2

Homework / Lab assignment #2 (3 parts, a - c)

a) Chapter 2 Review Definitions (write good definitions!)

b) Exercises 2.1, 3, 4, 5, 6*, 9. (*Table for 2.6 shows "Pounds Lost")
HINTS: 1) Problem 2.5 requires working backwards
2) Table 2.2 and section on page 12 and 13: The idea is to put three critical concepts together in a formula: "scores" (e.g., the total for one subject), the IV Effect, and Error. The IV Effect is arbitrarily set to 0 for one group (the control group). This is a way to summarize our understanding. We will use these concepts again soon, and the arrangement of Table 2.2 will be replaced by better arrangements and formulas.
Error *is calculated as,* x - Mean*, where* x *is the score.*

c) Generate 3 Operational Definitions (they could be from your last week's experiments. For each, provide a sentence that says what is being measured in how it would be measured.)

WEEK 3: Long week; easy but important concepts!

Goals

Learn about two essential tools:
Measures of central tendency (mean, median, mode),
Frequency distributions and their graphic presentations (Frequency Polygons)

Master the Standard Deviation — learn to calculate it and know its meaning and purpose

Read

Chapter 3

Homework / Lab assignment #3 (4 parts)

a) Chapter 3 Review definitions

b) Exercises 3.1(calculate SD for each group, also make frequency polygons), 2, 4 (optional practice: 3.3, 5 not extra credit)

c) Week 3 Exercise: Graphing Frequency Distributions —

Make 3 Frequency Histograms, including the frequency polygons (outlines), from things you measure. We will go over an example this week in class. One histogram could show the frequency of nominal categories; at least two should show frequencies of quantitative scores (numbers, although the numbers can be in categories such as 10 – 14, 15 – 19…).

** continues next page **

d) More practice: Use the methods taught in class (or Chapter 3; also see "Stats Calculators"*) to calculate SD of…

1) 3, 7, 9

2) 2, 9, 9

3) 3, 4, 4, 5

4) 0, 4, 5, 9

* "Stats Calculators" are on Sanocki's web site, ExamInfo page; they provide sheets with formats for calculating the statistics.

If you should do Exercise 3.7 (which is *not* on the homework), here are some *corrections* to the answers:

3.7a, mode, there are 2 modes, 10 and 11.
3.7a, median, is 10.

CHAPTERS 4 & 5: POPULATIONS & SAMPLE MEANS
(we are just starting to climb, still easy climbing)

WEEK 4
Goals
Become familiar with samples and populations of scores
Learn the further concept of samples of *means*
Learn to generate and graph a sample of *means*
Gauge the accuracy of means —
how close to the true population mean? (this is the *Standard Error* of mean)

Read Chapters 4, 5* (*See Chapter 5 corrections below & next pages!*)

Homework (#4, 5 parts)
a) Chapter 4 Review definitions

b) Exercises 4.1-7

c) Week 4 Exercise: Meaningful Distributions —
Think up 3 abilities and populations. E.g., choose one's you like and excel in (e.g., ability to rollerblade among the population of those 45 and older).
For each of the 3, draw a standard normal distribution. Divide it up into percentages between each standard deviation. Add lot's of labels. In the example, the low end might have "can barely walk".. Put and "x" for where you fall. In rollerblading, I might be almost 2 SD's up among my carefully defined population! Will work through example in class.

d) Chapter 5 Review definitions

e) Exercises 5.1-5**

* Publisher/typesetter introduced errors; the *CORRECTED* pages follow…

p. 37:
9 lines up from bottom, “0 to 21” should be “0 to -1”
6 lines up from bottom, “11 SD” should be “+1 SD”
p. 40
12 lines from top, “22 SD” should be “-2 SD”
next line, “22 to 21 SD” should be “-2 to -1 SD”
midde of page, #1, “11 SD”’s should be “+1 SD”’s
#2, “12 SD’s” should be “+2 SD’s”

**Corrections to answers for 5.5:
5.5.a, SE — males = 0.516, SE — females = 0.666
5.5.b, SE — males = 0.258, SE — females = 0.333

CORRECTED *SFS* TEXT (my original text): p. 37

Normal Distributions and Standard Normal Distributions

A remarkable thing is often discovered when a very large sample of scores (a population) is measured: the scores form a **normal distribution**. For example, consider the heights of babies. How tall (long) is the average nine month old girl? What is an unusually short size? An unusually tall one? Try to figure the answer out from the frequency polygon in Figure 4-1. This is a slightly simplified version of the actual population data for female infants. Check[1]

Note the normal shape of the distribution. As you learned in the previous chapter, it is symmetrical and bell-shaped. Something else is extremely important: The shape can be divided into regularly sized regions that form a pattern that can be used over and over, much like a dress-pattern can be used over and over. The pattern is called the **standard normal distribution**.

Let's begin by looking at the pattern. The crucial aspect is the vertical bars. Note that there is one bar in the middle, at the mean. In most cases, we use the mean as the starting point. It is the center of the distribution, marked with a 0 on the standard deviation scale. From the mean of 70 cm, we can go down one standard deviation (-1 SD), which is 2.5 cm in the present case. This puts us at 67.5 cm. These units are called **standard units**, or **z-scores.** Thus, a score of 75 would have a z-score of what? Check[2].

Here's a remarkable fact: Between the bars marked 0 and -1, about 34 percent of the scores will be in the region. That is, about 34 percent of the baby heights will be in this range (67.5 to 70 cm). What if we went up from the mean? Where would we go to and what percent would be in that region? Check the next paragraph.

Going up, we would go from the mean of 70 cm to 72.5 cm (+1 SD). Again, 34 percent of the scores would be there. Mark these percentages in the figure.

We can then go out one more standard unit, to the second standard deviation. These occur at 65 and 75 cm. Fourteen percent of the scores occur between the first and second standard deviations, on each side. Beyond the second standard deviations, there is about 2 percent of the scores on each side. To summarize:

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[1] You should have found the average height to be 70 cm (27.6 inches). Unusually *short* begins where the left side of the curve gets low, somewhere around 65 cm; unusually *tall* begins on the right, somewhere around 75 cm. If you had problems with this, review.

[2] 75 is 2 standard units up, or a z-score of +2.

p. 40, original correct text

Cumulative Distributions

It is also helpful to view normal distributions in one other way. Instead of looking at them from the middle (mean) outward, which we have done so far, you can also look at them from left to right. In this view, the scores **cumulate**. This is shown in Figure 4-3. The basic idea is that you begin with the lowest scores at the left, and add up the percentages as you go to the right. We are now concerned with "the percentages of scores under (left of) a certain score." Thus, the leftmost tail, up to -2 SD, is 2%, and the next region (-2 to -1 SD), adds 14%, cumulating to 16%. What will be the cumulative total up to the mean? It would be 50%. Finish labeling the distribution. Cumulative percentages are usually called "percentiles." To practice this way of viewing the scores, use Figure 4-3 to answer the questions below.

What percentage of scores is under +1 SD? Remember that this includes *all* scores under +1SD.

What percentage of scores is under +2 SD? (Check your work[4])

Week 5 get ready for exam;

SPSS 1 in lab *after* exam but no new homework

SPSS = Statistical Package for Social Sciences

Attend lab to be guided through assignment and make SPSS easy!

SPSS #1: Spreadsheets and descriptive statistics (15 points)
Instructions (assignment) is on BlackBoard
Do assignment in lab, save results and print them out.
On printout, underline and define important concepts by hand,
neatly for your lab instructor.
Note: You may want an alternate e-mail to e-mail your results
(Blackboard is sometimes down)

CHAPTER 6: Testing for NOTHINGNESS (CHANCE)
(climbing gets a bit tougher!)

WEEK 6

Goals

Learn to stand on your head (think based on the assumption that chance is the *only* thing that influences the scores — the IV has no effect at all!)

Learn the strange logic of a statistical test

Read

Chapter 6* (3 typos below)

Homework (#5, 3 parts)

a) Chapter 6 Review definitions

b) Exercises 6.1-5. Use our main formula for SE_{diff} [equal-*n*] = sqrt(SD^2/n + SD^2/n) **
** Typo in answers: sign of IV Effect is reversed (- rather than +)

c) Define in your own words:
Type 1 and Type 2 Errors;
Draw and label (own words) 2 X 2 decision box

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* Typos… p. 52 bottom box, For each sample we calculate: 1. Means M_1 *and* M_2

p. 59, 2nd line from top, replace: "is like the SD before you squared it"
with the correct phrase: "is the SD before you *un*squared it (i.e., the SD^2, or variance)"

p. 59 footnote 3, 3 not 2 in square root: Case A: Sediff = sqrt(2/3 + 3/3) = sqrt(5/3) = sqrt(1.67) …

CHAPTER 7: The *t*-test (warning — extreme heights!)

WEEK 7

Goals

Main: Understand how to do the t-test, and what it means
Also important: Understand additional relevant concepts, including:
Degrees of freedom
t-table
One-tailed versus two-tailed tests
Type 1 and Type 2 Errors
Power and Effect Size

Read

First read Chapter 7 with emphasis on first half (to p. 76),
then carefully reread and finish chapter*
(*except* bottom of p. 85 & p. 86, covered week 9)

Homework (#6, 5 parts)

Use textbook method (p. 72) to obtain t values for the following pairs of samples (Sample 1 and Sample 2). (Or try "Stats Calculators" from Sanocki web site; similar form.)
a) Sample 1: 4, 6, 6, 8; Sample 2: 8, 10, 10, 12;
b) S1: 12, 15, 16, 18; S2: 16, 18, 15, 20;
c) S1: 1, 4, 16, 18; S2: 4, 6, 20, 22.

d) Exercises 7.1-6. Note, SE is $SE_{Difference}$

Also note: If you can't find exact *df* for critical *t* in t-table, use the next lowest *df*

e) Chapter 7 Review definitions (all)

* Typos, 1 big, see next page...

(Week 8, no new assignments; focus on exam!
Plan to attend lab Week 9 for SPSS #2)

IMPORTANT:

p. 71, "Formula for *t*-test" box, bottom: replace "=" with "+" as shown:

$$\sqrt{\frac{SD_1^2}{n_1} + \frac{SD_2^2}{n_2}}$$

p. 76, first paragraph, the "box" is on p. 77, not 81

p. 82, top, in formula for Cohen's *d*, both SD's under the square root should be squared (SD^2), as shown:

$$SD^2/2 \quad + \quad SD^2/2$$

(the SD's are for groups 1 and 2)

Exercises (clarifications and typos):
In the answers, the sign of the t (plus or minus) may be reversed; that is ok.
7.1 This question will ask you to use a "one-tailed" t-test. Most t-test are "two-tailed," however, including the rest of the exercises.
7.5 d) $t_{critical}$ = 2.306. (not 2.603).

WEEK 9: TRANSITION TO EXPERIMENTAL DESIGN (whoa, extreme heights!)

Goals

This is a very import week; gather your wits! **Attend lab to make SPSS easy (see below!)**
We will move to a higher level of abstraction — experimental design

Start to learn about experimental design:
    Independent versus dependent samples (from chapter 7),

Repeated measures t-test

Foundations in design for Analysis of Variance
    Between groups variance
    Within groups variance

Read

Supplements handed out in class
Chapter 7 p. 85-87
Chapter 8 to p. 103

Homework (#7, writing); also do SPSS!

Describe/define:

Independent samples (& generate an example of this type of experiment)
Dependent samples, (& generate an example of this type of experiment)

Repeated measures t-test (& explain reasons for using repeated measures)

Between groups variance (describe what influences this)
Within groups variance (describe what influences this)

What is the meaning of the F-value?

SPSS 2 (15 points): *t*-test,

Instructions to be e-mailed. Attend lab to be guided through SPSS.
Hand in print-outs with important concepts highlighted and defined.

WEEK 10: CHAPTERS 8 & 9 in detail: Testing Multiple Groups With ANOVA

Goals

Map from last weeks concepts to ANOVA:

Understand what it means to have:
Multiple levels of one Independent Variable (One-Way ANOVA)
Multiple Factors, or Multiple IV's (Multi-factor ANOVA)

Learn to calculate One-Way ANOVA
Calculate deviations, square deviations
Use Source Table to summarize
F = Between Variance / Within Variance

Read

Chapters 8 & 9*

Homework (#8, 4 parts)

a) Chapter 8 Review definitions
b) Exercises 8.1*, 2 (F-value for Exercise 8.2 is given in answer to 8.3)
c) Chapter 9 Review definitions
d) Exercises 9.1, 9.3

* **Typo's**:
p. 97, Table 8.3, Mean for A1 should be 6, for A2 should be 5
p. 98, Table 8.4, Mean for A2 should be 5
p. 116 in Box, Definition of Deviations: x_i should be used (not mean of X_i)
p. 117 last full sentence, "…degrees of freedom in numerator…" (not denominator)
p. 121, just below *F*s formula put "-" in place of "+":
"where (a - 1) is the degrees…"

Answers to Exercise 8.1.a messed up !! Use next page
(or replace all "2"'s with negative signs "-"); Grand mean is 5.5.

9.3b-c. In answer source table, the MS for error/within should be .667 (some of the digits were shifted over)

ANSWERS Exercise 8-1 as originally written (these are correct)

8.1

a.)

	TOT.			**IV (BETWEEN)**			**ERROR (WITHIN)**		
	1. Total Dev	**2. Total Dev**	**3. Total Square**	**4. IV Dev**	**5. IV Dev**	**6. IV Square**	**7. Error Dev**	**8. Error Dev**	**9. Error Square**
1.	7-5.5	1.5	2.25	6-5.5	0.5	0.25	7-6	1	1
2.	5-5.5	-0.5	0.25	6-5.5	0.5	0.25	5-6	-1	1
3.	4-5.5	-1.5	2.25	6-5.5	0.5	0.25	4-6	-2	4
4.	8-5.5	2.5	6.25	6-5.5	0.5	0.25	8-6	2	4
Mean A = 6									
5.	3-5.5	-2.5	6.25	5-5.5	-0.5	0.25	3-5	-2	4
6.	7-5.5	1.5	2.25	5-5.5	-0.5	0.25	7-5	2	4
7.	6-5.5	0.5	0.25	5-5.5	-0.5	0.25	6-5	1	1
8.	4-5.5	-1.5	2.25	5-5.5	-0.5	0.25	4-5	-1	1
Mean B = 5									
Grand Mean = 5.5									
SUM OF SQUARES			**22**			**2**			**20**

b.)

Source	**Sum of Squares (SS)**	**df**	**MS**	**F-Obtained**
IV/Between	2	2-1=1	2	
Error/Within	20	8-2=6	3.3	F=2/3.3=.60
Total	22	7		

c.) Fobtained = .60

d.) Fcrit = 5.99

e.) Fobtained < Fcrit; therefore, accept null. The two samples are not significantly different.

CHAPTER 10: Testing Multiple IV's With ANOVA

WEEK 11: Now we do some extreme climbing !!

Goals

Devote quality time to Multi-factor thinking:

Learn 2 X 2 Tables (Main effect A, Main effect B, Interaction)

Learn multi-factor ANOVA formula ("deviations")

Learn to identify interactions
(Interaction means influence of one IV *depends on the level of* other IV;
interaction mean effects of IV's are not additive)

Read

Chapter 10*

Homework (#9, 2 parts)

Chapter 10 Review definitions
Exercises 10.1**, 2, 5a (optional practice, 10.3, not extra credit)

* Typo's:
p. 133, Lines 7 & 8 from top, correct text is:
"Underlining is good for history and bad for math…whereas outlining is a little better for math…" instead of, "Outlining is good for history…"

p. 137, First formula, 10 lines down: "Interaction = …", these are all means (bar for mean of A is missing; that is the second term)

** For 10.1c, there are errors in the "Error" row because the 4 and 2 were shifted.
Instead of no df and MS = 2 and F = 2,
it should read, df = 4, MS = 2.

CHAPTER 10: Interpreting 2 X 2's

(keep pushing up the mountain puf puf !!)

WEEK 12

Goals

Consolidate understanding of 2-way ANOVA

Master 2 X 2 Tables (Main effect A, Main effect B, Interaction)

Master interactions
(Interaction means influence of one IV *depends on the level of* other IV; interaction mean effects of IV's are not additive)

Read

Review Chapter 10

Homework (#10, 2 parts) + SPSS

Find the Interaction Exercise (to be distributed)

Make up 3 2 X 2's (IV's), produce possible data, and interpret the effects (state main effects and whether interaction occurs, verbally describe what is happening). At least one of these examples should be interactive.

Additional Homework Assignment: SPSS 3 (15 points)

SPSS 3: Running a Multi-Factor ANOVA, to be e-mailed

Hand in print-outs with important concepts highlighted and defined

CHAPTER 11: Correlation & Regression Concepts: Using Uniqueness

WEEK 13

Goals

Learn the concepts of Regression: Slope, Intercept, linearity

Learn concept of Correlation

Review Z-scores,

Correlation = mean of the "cross-products of Z's"

Read

Chapter 11* (to p. 162)

Homework (#11, 2 parts)

First 12 Chapter 11 Review definitions (through Cross Product)

Correlation / Regression Exercise (next page)

* Typo in first, five step Method, step 3:
Correct: "For *m*, sum the *XY* column, then divide by sum of X^2 column."
(instead of, …sum the *XY* column, then divide by sum of *XY*…)

Correlation / Regression Exercise: For each of the two problem sets below:

1. Make a scatterplot (by hand).
2. Calculate the correlation using the z-score, cross-product formula:
   (you are taking the mean of the cross-products; *SFS* p. 159-161)
   Use the means and SD's given to convert scores to z-scores*;
   for each subject, calculate cross product of z's by multiplying them;
   sum cross products and divide by n to get correlation (r value).
3. Fit a regression line by eye and hand, intuitively, to scatterplot.
4. Calculate the slope of the regression line:
   Pick two points along the X axis
   Estimate the Y values, by eye and hand
   Calculate slope:
   Difference in Y / Difference in X (for the pairs of points)
   Estimate the intercept (the value of Y when X is zero)
5. Using your slopes and intercepts, estimate the value of Y when X is 8.

* z = (score - mean) / SD

Problem Set 1

	X	Y
	4	20
	6	39
	6	34
	3	17
	1	15
M's	4	25
SD's	2.12	10.79

Problem Set 2

	X	Y
	4	15
	6	10
	6	14
	3	17
	1	14
M's	4	14
SD's	2.12	2.55

CHAPTER 11: Multiple Regression

and then CHAPTER 13: Perspective: Which statistic when?

WEEK 14

Goals

Consolidate Correlation & Regression
[Optional if time: Multiple Regression through lecture example]

Step back and gain perspective on the statistics:
Learn differences between statistics and understand when to use each, based on the type of research design and the type of data.
* IMPORTANT FOR FINAL EXAM! *

Read

Chapter 11 (review all)

Chapter 13 (learn basic concepts)

Homework (#12, 3 parts)

All Chapter 11 Review definitions, ALL (yes, some repetition)

Exercises 11.1, 3, 4, 5

Chapter 13 Exercises: 1 – 9 IMPORTANT FOR FINAL EXAM!

CHAPTER 12: Analyzing How Often an Event Occurs — Chi Square

WEEK 15

Goals

This is a fairly simple statistic, one last hill before parking lot!

Understand concepts relevant to Chi-Square:
- frequency of occurrence
- categories
- distribution by change

Calculate simple Chi-Square
Understand Contingency Tables intuitively (no CT calculations on exam)

Read

Chapter 12

Homework (2 parts, definitions + problems)

Chapter 12 Review definitions

More problems:

a) A coin is tossed 10 times and comes up Heads 8 times and Tails 2. Is it fair?
b) What if it came up 9/1? 7/3?
c) Test if this 6-sided die is fair. It was rolled 20 times; frequencies are:

Value:	1	2	3	4	5	6
Frequency:	2	3	2	3	2	8

LAB INSTRUCTOR WILL TELL YOU WHEN/WHERE TO HAND IN

PSYCH STATS OLD EXAMS, provided for *self-learning*.

LEARN *HOW* TO ANSWER the QUESTIONS; memorization of answers won't help.

All answers are in the textbook or lecture.

Instructors can provide some clarification of terms but *not* answers.

EXAM 1 WILL NOW INCLUDE MATERIAL ON CHAPTERS 4 AND 5;
See Exam 2, Questions: 3, 11 – 18 for examples

FORM C Dr. Sanocki, PSY 3204 EXAM 1 NAME_____

Indicate your best answer on scantron. *Lightly* mark answers on this exam and keep for your records. You can use this exam as a worksheet

1. An interaction is:

   a. When one participant influences the score of another participant.
   b. When the effect of one variable adds to that of another variable.
   c. When the influence of an IV depends on the level of another IV.
   d. confound

2. An important method for controlling extraneous variables, in which subjects are placed into groups via the flip of a coin is called:

   a. elimination
   b. constancy
   c. nuisance variables
   d. random assignment

3. An example of an interaction [must be important concept!] is:

   a. When one participant influences the score of another participant.
   b. When the effect of one variable adds to that of another variable.
   c. When the influence of an IV depends on the level of another IV.
   d. A confound

4. Which type of scale is the most quantitative measurement scale?

   a. ordinal
   b. interval
   c. ratio
   d. nominal

5. The following is the order of problem-solving outlined for science:

   a. Evaluate solutions; consider alternative solutions; be problem-focused.
   b. Be problem-focused; consider alternative solutions, evaluate solutions.
   c. Evaluate solutions; consider alternative solutions, be problem-focused.
   d. Consider alternative solutions; be problem focused; evaluate solutions.

6. The difference between the two types of extraneous variables known as nuisance variable and confound is:

a. Nuisance variables influence one level of the IV more then the other level, whereas confounds influence both levels about equally in the long run.
b. Confounds influence one level of the IV more then the other level, whereas nuisance variables influence both levels about equally in the long run.
c. The experimenter can control the amount of correlation to the independent variable in the case of confounds but not in the case of nuisance variables.
d. The experimenter can control confounds but not nuisance variables.

8. Another name for nuisance variable is:

a. error
b. confound
c. necessary conditions
d. crap

9. Nuisance variables:

a. Are a necessary step in the creating of an experiment
b. Confound the interpretation of the experiment
c. Add to within group variability in an experiment
d. Add to a between group variability in an experiment

10. There is a true zero point in a(n)_____scale.

a. ordinal
b. interval
c. ratio
d. nominal

11. The scale of hurricane intensity (category 1-5) is what type of scale?
(As this question shows, some scales fall on the borderline of two types.)
a. nominal/categorical
b. ordinal
c. interval
d. Sort of ordinal and interval -- it definitely has order, and the "distance" between each category is approximately equal (though not precisely so).

12. Differences *between* how Americans as a whole think about using banks and how Japanese as a whole think about banking (*SFS, chapter 1*)

a. variation between groups
b. variation within groups
c. large-scale differences
d. small-scale differences

13. Differences *within* America and *within* Japan in how many people think about banking
   a. variation between groups (*SFS, chapter 1*)
   b. variation within groups
   c. large-scale differences
   d. smaller-scale differences

14- I want a single number to summarize the height of my basketball team, which includes boys and girls aged 6 through 12 (some extreme scores!). What measure is best?

   a. median
   b. mean
   c. frequency
   d. distribution/polygon

15. To provide the most complete look at how the heights are spread out in 14, which procedure is best:

   a. median
   b. range
   c. standard deviation
   d. frequency distribution/polygon

16. An experimenter treats every participant in a study differently. As a result the variability of participants' scores within the group increased. For this study, the experimenter has introduced a (n):

   a. uncontrolled variable
   b. independent variable
   c. confounding variable
   d. nuisance variable

17. _____are used to provide summaries of set of numbers.
   a. inferential statistics
   b. sampling statistics
   c. descriptive statistics
   d. nuisance variable

18. The problem solving attitude advocate in lecture requires

   a. strict adherence and testing of possible solutions
   b. years and years of study
   c. consideration of alternative solutions
   d. belief that hypothesized solutions will work

19. According to lecture, quality in science is encouraged by

   a. peer review, in which other people in the same research area review results
   b. peer review, in whish persons from other professions review results
   c. substantial financial support from companies interested in results

d. private companies such as prudential

20. Which is an interaction?

a. effects of drug A become stronger when taken with drug B than alone
b. effects of drug A are twice as strong as drug B alone
c. patients influence each other's choices
d. drug A increases socialization when taken

21. Variables other than the IV that cause differences between groups are:

a. extraneous variables
b. confounds
c. nuisance variables
d. dependent variables

22. _____are used to determine if an IV effect is real

a. descriptive statistics
b. inferential statistics
c. sampling statistics
d. experimental statistics

Use data set Y with 12 scores for #23-27

Data set Y, sample of 12 scores for analysis

2	2	4
7	3	6
4	5	4
8	2	5

23. The distribution of this sample is

a. symmetrical
b. unimodal
c. normal
d. bimodal

24. This distribution is

a. positively skewed
b. negatively skewed
c. balanced
d. standard

25. The median is

a. 4
b. 4.5
c. 5
d. 6

26. The range is

a. 5
b. 6
c. 7
d. 8

27. The mean is

a. 48/12
b. 50/12
c. 52/12
d. 54/12

Use data set Z with two treatment conditions for 28-31

Data set Z, scores from 2 conditions/groups

Treatment 1	Treatment 2
12	8
8	2
10	5

28. The IV effect is

a. 3
b. 4
c. 5
d. 7

29. The error for the first subject is

a. 2
b. 4.5
c. 5
d. 7

30. The SD for treatment 1 is

a. √2
b. √4
c. √8
d. √9

31. The SD for treatment 2 is

a. √2
b. √4
c. √8
d. √9

34. The symbol ∑ means

a. multiply
b. sum
c. eat
d. Greek

35. Error refers to:

a. mistakes in the experimental group design
b. miscalculations of your statistics
c. differences of participants' scores between the control group and experimental group
d. part of the score unique to the individual

36. Dr. No has a control group and an experimental group take a test. The control group does nothing before the test, whereas the experimental group does exercises designed to synchronize different brain regions. The experimental group ends up doing better on the test. In this case, individual differences in intelligence would be

a. a confound
b. a nuisance variable
c. an extraneous variable
d. irrelevant in this study

37. In the above study, Dr. No concludes that brain synchrony increases performances. You point out (this was an old lecture discussion topic not now used),

a. increased blood flow from exercise (an effect of the exercises in addition to synchrony!) is a confound that could have effected the exercise group but not the control group
b. increased blood flow from exercise is a nuisance variable
c. this is a correlation study that cannot prove causality
d. there are too many extraneous variables to ever draw a conclusion.

38. In an experiment, subjects are divided into groups that take a test under different conditions: Either in a room with blue light, or normal lighting. Performance on the text is measured. The score on the test would be the:

a. dependent variable
b. independent variable
c. an extraneous variable
d. a nuisance variable

39. In this same experiment, the type of lighting would be:

a. dependent variable
b. independent variable
c. an extraneous variable
d. a nuisance variable

40. Median is the best measure of central tendency

a. When you do not have a calculator for the mean.
b. When the numbers are large.
c. When there are extreme scores in your sample
d. Under no conditions; mean is always best.

32. In a population distribution, what percentage of scores is between -2SD and -1SD?

a. 34
b. 16
c. 14
d. 2

33. In a population distribution, what percentage of scores is between -1SD and the mean
a. 34
b. 16
c. 14
d. 2

Form C

Exam 2

Dr. Sanocki, PSY 3204 NAME_____

EXAM 2

OLD EXAMS: LEARN *HOW* TO ANSWER QUESTIONS; DO NOT SIMPLY MEMORIZE (won't help)

1. The null hypothesis is based on the
a. distribution of IV Effects the experimenter expects
b. distribution of differences between means caused by error alone
c. a sampling distribution of average errors
d. idea of null samples

2. Experimenters most like
a. high amounts of spread
b. high within-sample variation
c. large between-sample differences
d. weak manipulations of the IV

3. In a normal distribution, you know that the mean of the scores is 50 and the standard deviation is 5. A score of 60 would therefore
a. fall one standard deviation above the mean

b. fall two standard deviations above the mean
c. fall one standard deviation below the mean
d. fall two standard deviations below the mean
e. cannot interpret the score with the information given

4. When the results of a research project are significant, we can say with most confidence that they:
a. have proved our experimental hypothesis
b. demonstrate that nuisance variables were not present in the research
c. occurred rarely by chance
d. demonstrate that a confounder was not present in the research

5. You find children who take vitamins have higher health index scores than children who do not take vitamins ($p < .05$). You have found that these two groups of children are
a. significantly different
b. different because of chance
c. positively correlated
d. negatively correlated

6. A one-tail test of significance is associated with a:
a. directional hypothesis
b. non-directional hypothesis
c. positive correlation
d. negative correlation

7. A Type I error is when:
a. null hypothesis is true, but rejected
b. null hypothesis is true, and accepted
c. null hypothesis false, and rejected
d. null hypothesis false, but accepted

8. A Type II error is when:
a. null hypothesis is true, but rejected
b null hypothesis is true, and accepted
c. null hypothesis false, and rejected
d. null hypothesis false, but accepted

9. If you could compare all men and women in the world, assume that you would find no difference in intelligence. If you conducted an experiment and the statistics said that women have significantly higher intelligence scores than men, you have made a
a. correct decision
b. Type I error
c. Type II error
d. Type III error

10. The t test can be seen as a ratio of _____ divided by _____.
a. between-group variability, within-group variability
b. within-group variability, between-group variability
c. the effect of the DV, the effect of the IV
d. error/nuisance variables, IV Effects

11. When the raw data come from a very non-normal population,
a. one should use non-normal statistics
b. the likelihood of confounds greatly increases
c. distributions of means will be more normal than the population
d. statistical tests should not be attempted

12. Nuisance variables cause
a. confounds
b. within-group variability
c. between-group variability
d. a directional hypothesis

13. Random assignment is more likely to create equal groups when
a. small samples are involved
b. large samples are involved
c. within-subjects comparisons are to be made
d. a directional hypothesis is being tested

14. Consider a normal distribution with a mean of 65 and a standard deviation of 7; 34% of all the scores in this distribution occur between the scores of:
a. 58 and 65
b. 58 and 72
c. 65 and 79
d. a and c
e. none of the above

15. Consider a normal distribution with a mean of 50 and a standard deviation of 5. The percentage of scores found between 45 and 55 is:
a. 68%
b. 34%
c. 14%
d. 2%

16. The SD = 6 and sample size is 4. How accurate are the *means*, on average? (*means*!)
a. 6/3
b. 6/4
c. 6/(square root(4)) = 6/2
d. cannot tell without further information

17. The mean is 20, the SD = 10, and sample size is 4. What percentage of *means* (with n = 4) would be between 20 and 30?
a. 48
b. 34
c. 14
d. cannot tell without further information

18. The amount of spread in the scores is associated with:
a. a measure of central tendency
b. the X axis on a line graph
c. a measure of variability
d. the selection of the IV

19. Sample size n = 8 per group.
Experimental Mean = 20
Control Mean = 8
Standard Error of Difference = 2

What is the value of t?
a. 2
b. 3
c. 5
d. 6

20. Sample size n = 12 per group.
Experimental Mean = 16
Control Mean = 10
Standard Error of Difference = 3
What is the value of t?
a. 2
b. 3
c. 5
d. 6

21. Power is
a. the ability to detect an IV Effect when it is real
b. the strength of an effect in an experiment
c. a result that was unlikely to occur by chance
d. the probability of rejecting the null when the null hypothesis was true

22. Effect size is
a. the probability of rejecting the null when the null hypothesis was true
b. the ability to avoid accepting the null hypothesis when there is an IV Effect
c. the best measure of the size of an IV effect in an experiment
d. the size of an IV Effect that is likely to occur by chance

23. Significance refers to
a. the ability to avoid accepting the null hypothesis when there is an IV Effect
b. a result that was unlikely to occur by chance
c. the size of an IV effect in an experiment
d. the probability of rejecting the null when the null was true

24. Large values of t (beyond +/- 2)
a. will not occur by chance
b. will only occur if confounds contribute
c. will be more likely if there is lot's of error
d. can occur by chance, but rarely

25. By using smaller p values in statistical inference,
a. probabilities of success are increased
b. probabilities of rejecting the null hypothesis increase
c. probabilities of rejecting the null hypothesis decrease
d. statistical power increases

26. Sample 1: $SD^2 = 16$, n = 8;
Sample 2: $SD^2 = 16$, n = 8;
$SE_{Difference}$ =
a. square root of 4 = 2
b. square root of 16 = 4
c. 8
d. 16

27. 95% of the IV Effects by chance are within the actual values of -2 and +2,

so $SE_{Difference}$ =
a. 4
b. 2
c. 1
d. cannot tell without further information

28. Confounds will
a. not influence statistics
b. show up as a negative t value
c. contribute to the amount of error
d. increase or decrease the apparent IV Effect

29. Which hypothesis warrants a smaller critical t and why?
a. women will score higher than men; it is a directional hypothesis
b. women will score higher than men; it was stated before the experiment
c. women will score differently then men; it is a non-directional hypothesis
d. women will score differently then men; it was stated before the experiment

30. The sample size in an experiment are 12 and 8. The degrees of freedom for t are:
a. 8
b. 12
c. 18
d. 20

EXAM 3 *Partial* Form C

OLD EXAMS: LEARN *HOW* TO ANSWER QUESTIONS; DO NOT SIMPLY MEMORIZE (won't help)

Dr. Sanocki, PSY 3204

NAME_____

For EXAM III — *SEE ALSO EXAM 4 FOR MORE ANOVA 2 X 2!!!*
THIS ANOVA / 2X2 MATERIAL NOW APPEARS ON EXAM 3:
Exam 4 Questions 1 – 7, 10 – 11, 14 – 21, 30 – 33

Choose best answer *lightly*. Mark exam for your records.

---

1. _____ _____ is an experimental design with more than one IV.
   a. multi-level design
   b. factorial design
   c. independent design
   d. multiple correlated

2. _____ also means "Independent Variables"
   a. Factors
   b. Interaction
   c. Levels
   d. Dependencies

3. In your experiment, you plan to give people three different types of chocolate to see which one they like the best; this means that you have _____ levels of the IV.
   a. 2
   a. 3
   b. 4
   c. 6

4. _____ groups are groups of research participants who are related, through matching or repeated measures.
   a. independent
   b. correlated
   c. confounded
   d. dependent

5. _____ variation in scores is due to factors other than the IV.
   a. Error
   b. Between groups
   c. Source
   d. Mean square

6. The t-test and ANOVA give similar results ($t^2 = F$) for what kind of design:
   a. 2 X 2 factorial
   b. multi-level one factor
   c. one factor two group
   d. Latin Square

7. This allows you to compare variance from the IV Effect and from error in the F-ratio:
   a. Comparison Table
   b. Source Table
   c. Sums of Squares Table
   d. IV/Error table

8. _____ is the square of the Standard Deviation
   a. variance
   b. standard deviation
   c. mean square
   d. sum of squares

9. If you are using repeated measures, then you are including all subjects in _____ of the treatment conditions.
   a. half
   b. one-third
   c. all
   d. many

10. If 10 subjects serve in one group and 10 others in the other group, the groups are
    a. dependent
    b. correlated
    c. random
    d. independent

11. You would describe a design with two levels of IV A and three levels of IV B as:
    a. 2 x 2
    b. 3 x 2
    c. 3 x 3
    d. 2 x 3

12. The t-test was invented by
    a. a mathematical and statistical genius
    b. a professor in England
    c. a statistician working in a brewery
    d. a rock and roll drummer for t-Rex

13. In ANOVA, each score can be decomposed into deviations, i.e.,
    a. IV Effect, Error
    b. IV Effect/Error
    c. Total, IV Effect, Error
    d. Total = IV Effect + Error

14. C_1 refers to
    a. Third subject
    b. Third level, first variable
    c. Third variable, first level
    d. Constants used in ANOVA

15. With M = mean, what is meant by x_i - M_G
    a. the middle point of all scores
    b. error in a score
    c. total deviation in a score
    d. IV Effect in a score

16. With multi-level ANOVA, a significant effect means
    a. the difference between two groups was not due to chance
    b. there was a synergistic effect between the levels
    c. the difference between groups could occur by chance
    d. there is a difference somewhere between the means

17. If M = mean, what is meant by M_G
    a. the middle point of all scores
    b. error in a score
    c. total deviation in a score

d. IV Effect in a score

For questions 18-21, complete the source table:

You are comparing 3 types of training methods for the GRE and you have 5 subjects in each condition. Please fill in the blanks with these possible answers:

a. 12
b. 15
c. 42
d. 38

Source	**SS**	**df**	**MS**	**F**
IV	30	2	**20. _____?**	**21. _____?**
Error	12	**19. ____?**	1	
Total	**18._____?**	14		

Use the following data for questions 22-26:

A tofu company had 15 people rate different colors of package. The scale went from 1 to 10 (10 = best).

Green	Red	Blue
9	2	6
10	1	7
8	2	8
10	3	7
8	2	7

22. What is the grand mean?
    a. 1
    b. 2
    c. 4
    d. 6
    e. 9

23. What is the mean for level A_2?
    a. 1

b. 2
c. 4
d. 6
e. 9

24. What is the *absolute* deviation for IV for the first subject in A_2?
a. 1
b. 2
c. 4
d. 6
e. 9

25. What is the *absolute* deviation for IV for the second subject in A_2?
a. 1
b. 2
c. 4
d. 6
e. 9

26. What is the *absolute* deviation for Error for the second subject in A_2?
a. 1
b. 2
c. 4
d. 6
e. 9

For 27-31
Twelve people rated different colors of gas stations, on a scale from 1 to 7.

Green	Red	Blue
2	5	6
4	5	6
4	6	4
6	4	8

27. What is the grand mean?
a. 1
b. 2
c. 4
d. 5
e. 6

28. What is the mean for level A_3?
a. 1
b. 2
c. 4
d. 5

e. 6

29. What is the *absolute* deviation for Between for the second-to-last subject in A_3?
    a. 1
    b. 2
    c. 4
    d. 5
    e. 6

30. What is the *absolute* deviation for Between for the last subject in A_3?
    a. 1
    b. 2
    c. 4
    d 5
    e. 6

31. What is the *absolute* deviation for Within for the last subject in A_3?
    a. 1
    b. 2
    c. 4
    d. 5
    e. 6

32. Interaction can be detected in
    a. social psychology experiments where participants talk
    b. experiments with 2 or more factors
    c. experiments with multiple levels
    d. any experiment allowing interaction between subjects

33. Error deviations related to individual differences can be minimized in
    a. repeated measures designs
    b. low-nuisance designs
    c. constant subject designs
    d. designs with larger n's

34. What would be condition A_2B_1 in an experiment that factorially combines topic (the first factor; levels are *history* and *math*) and 2 levels of study (the second factor; levels are *read*, and *read & underline*)?
    a. history, math
    b. read, read & underline
    c. math, read & underline
    d. math, read

35. Which of the following is an interaction?
    a. younger voters (<30) favored candidate D whereas elders favored R
    b. Candidate X had twice as many votes as candidate Y

c. Candidate N had 1%, candidate D 49%, candidate R 50% in one state
d. Voters waiting in line were swayed by the majority of other voters in line

36. The SPSS printout says the level of significant is .06. By conventional statistical rules, we can
a. reject the null hypothesis
b. say the null hypothesis is proved
c. say we cannot reject the null hypothesis
d. say that a type one error is likely

37. In ANOVA, under the null hypothesis, the most likely F value is
a. 0
b. 1
c. 2
d. 4

38. Science and politics. During the Bush presidency, the influence of politics and greed on the scientific process has
a. been prevented
b. increased slightly
c. increased in critical ways (correct; occasional lecture topic)
e. completely taken over
(for more information see: http://www.ucsusa.org/global_environment/rsi/index.cfm
Also, Search "scientific integrity"; I have not found administration responses in my searches, though they may exist.)

39. After finding a significant effect with 6 levels of an IV, the follow up tests should
a. be conducted in the appropriate 6-step order
b. correct for the possibility of type 1 errors
c. be conducted with p = .02
d. group the levels into 2 or 3 subgroups

40. In the 2 X 2 ANOVA, what effects occur?
a. two 2-level effects
b. three 2-level effect
c. main effect of A, main effect of B, interaction
d. main effect of A, main effect of B, main effect of C

SEE ALSO NEXT EXAM, FOR ANOVA AND 2 X 2 QUESTIONS LISTED AT BEGINNING OF THIS EXAM !!

EXAM 4

Form C

NAME _____

WRITE NAME AND ***TURN THIS IN***

PSY 3204
Thomas A. Sanocki

Multiple choice. Choose best answer.

---

1. In experimental designs with two or more groups, the "levels" of an IV refer to the
   a. number of IV's in the experiment
   b. different amounts or types of the DV
   c. different amounts or types of treatment conditions
   d. the type of statistical analysis to be used

2. Which of the following does NOT represent a factorial design?
   a. the effects of sex and nationality on intramural sports participation
   b. the effects of five different therapies on recovery from depression
   c. the effects of music and snacking on study efficiency
   d. how grades are affected by fraternity status and major.

3. In a factorial design, the specific effect of one particular IV, regardless of the other IV's in the study, is called the
   a. main effect
   b. the interaction
   c. the F ratio
   d. the F probability

4. What is the main benefit possible *only* from factorial designs?
   a. you do not have to do a series of *t* test
   b. you can test more than one level at a time
   c. you can use non-random assignment

d. you can see how two IV's interact with each other

5. When an experiment has multiple groups varying on one factor, use
   a. t test
   b. ANOVA
   c. Multi-factor ANOVA
   d. Multi-level ANOVA

6. The part of an individual score that is different from the group or cell mean is
   a. differentiation
   b. error
   c. IV Effect
   d. interaction

7. The *F*-test is always a ratio of _____ to _____.
   a. main effect; interaction
   b. total variance; nuisance variance
   c. within variance; between variance
   d. between variance; within variance

8. The mean is preferable to the median
   a. in most cases but not with extreme scores
   b. distributions are unimodal
   c. when quick and dirty estimates are desired
   d. in all cases it is more robust

9. Randomly assigning subjects to treatment conditions
   a. makes an experiment more sensitive by reducing error variation due to subject variables
   b. distributes differences due to subject variables evenly between conditions
   c. is the most efficient way to conduct an experiment
   d. turns subjects into a randomized variable

10. The term x_i - M_A is involved in the computation of <u>SS</u> _____ in an analysis of variance.
    a. total
    b. IVA
    c. error
    d. between groups

11. The term x_i - M_G is involved in the computation of <u>SS</u> _____ in an analysis of variance.
    a. total
    b. IVA
    c. error
    d. between groups

12. Jane is calculating means from small and large samples of subjects. To see how accurate a given *mean* is she should use
    a. standard deviation
    b. standard error
    c. SDODBM
    d. a different approach, the necessary information is not available

13. Confounds influence the _____.
    a. the IV effect
    b. error
    c. degrees of freedom
    d. no effect on the statistic

For questions 14-18, use the following data, showing the effects of study method (A) and topic (B) on quiz performance:

		IV A	
		Underline	Outline
IV B	History	8	16
	Economics	12	12

14. What is the grand mean of this set of data?
    a. 8
    b. 10
    c. 12
    d. 14

15. What are the main effect means for IV A, underline vs. outline?
    a. 12; 12
    b. 10; 14
    c. 8; 16
    d. 10; 12

16. Which statement best describes the interaction of these two variables?
    a. There is an effect of history vs. economics in test scores
    b. People tend to do better in history when they underline the material and better in economics when they outline the material
    c. People tend to do better in history when they outline the material whereas there is no effect of study method for economics
    d. There is no interaction between the two variables

17. In these data, what is the deviation for IVA in the ANOVA formula?

a. 0
b. 2
c. 4
d. 6

18. What are the main effect means for IV B, history vs. math?
a. 14; 12
b. 12; 12
c. 0; 14
d. 10; 12

19. What is the equation for the interaction sum of squares (note: X means "Mean"):
a. $x_{AB} - x_A - x_B - x_G$
b. $x_{AB} - x_A - x_B + x_G$
c. $x_{AB} + x_A + x_B - x_G$
d. $x_{AB} + x_A + x_B + x_G$

20. Look at the data and pick the best description of the <u>interaction.</u> The dependent variable is athletic performance (higher = better).

		Time Between Eating Meal and Athletics	
		30 min.	2 hr.
Meal	Meat & gravy	8	14
	Mostly carbohydrates	14	16

a. High carbohydrates were better than meat, especially 30 min. after meal.
b. High carbohydrates 2 hr. before was best
c. High carbohydrates were best overall
d. Waiting longer after the meal was better.

21. In a confounded experiment the researcher cannot be certain whether the _____ variable or the _____ variable was responsible for any observed differences in behavior.
a. extraneous; dependent
b. independent; dependent
c. extraneous; independent
d. active; attribute

22. Correlation is good for
a. confirming causal relations
b. measuring strength of core concepts
c. measuring strength of relations between variables
d. measuring correlated behavioral change

23. In a linear regression, the intercept is 4 and the slope is 2. What is the predicted value of y when x = 3.
a. 0

b. 4
c. 6
d. 10
e. 12

24. Which correlation value (r) shows the strongest relationship?
a. -.75
b. 0
c. .50
d. .70
e. .79

25. Linear regression is concerned with
a. how one variable varies with changes in another variable
b. how one variable varies linearly with changes in another variable
c. the strength of the relation between X and Y
d. travel backwards through linear time to childhood

26. You are testing a coin for fairness. During 8 flips you get 6 heads and 2 tails. The value of Chi-Square (sum for all cells) is:
a. 2/4
b. 1
c. 2
d. 5

27. If males are assumed to be the same as females, what is the expected frequency of males in A_2? Chi
(Fraction values shown below)

	Males	Females
A_1	6	4
A_2	4	6

a. 2
b. 3
c. 4
d. 5
e. 6

28. In a linear regression, the intercept is 10 and the slope 4. What is the predicted value of y when x is 2?
a. 4
b. 8
c. 14
d. 18

29. Interaction is
    a. influenced by IVA and IVB main effects
    b. unique to multi-level ANOVA
    c. a unique effect of the combinations of variables
    d. less important than the main effects

Questions 30-33, describe the effects in the data. Possible answers:

a. Main effect of A only
b. Main effect of B only
c. Both main effects (only)
d. Both main effects and interaction
e. Interaction only

30. Graphs appear, as on "FIND THE INTERACTION" exercise (handed out in class)

31. graph

32. Table (determine effects, use answers above):

		IVB	
		B1	B2
IVA	A1	40	40
	A2	60	100

33-36. Pick which type of statistical approach is most appropriate for the type of research problem given. Use these possible answers:
a. t-test
b. multi-level ANOVA
c. multi-factor ANOVA
d. regression/correlation
e. Chi-Square

33. Sally studies post Psych Stats vacations, by interviewing students after vacations. She asks how long the vacations were (number of days) and asks for a rating of relaxation, on a scale from 1 to 7.

34. John studies post Psych Stats vacations, wondering if longer vacations are more satisfactory. He randomly assigns 10 students to 3-day vacations and 10 students to 7-day vacations, and measures relaxation after the vacation on a scale of 1 to 7.

35. Eric measures aerobic fitness after subjects engage in an exercise program. He manipulates exercise in two ways, to see if there is an interaction between type of exercise (fun or boring) and amount of exercise (small or large amount).

36. Jamie measures "readiness for another semester" after controlling participants' schedules and randomly assigning participants to either 6 days of vacation, 12 days, or 18 days.

37. When a strong correlation is found between variable x and y, we should
    a. consider this evidence for a causal relation
    b. check for nonlinear relations
    c. worry about other variables that might cause the changes in X and Y
    d. write a press release