

## Psychology 320 and 320L: Psychological Statistics Fall Semester 2009

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Office Hours: TBA (Due to Furloughs by State of California);

**REQUIRED Text:** Comrey, A.L. & Lee, H.B. (2007). Elementary Statistics: A Problem Solving Approach, 4<sup>th</sup> Ed. Lulu.com ISBN: 978-1-4116-6616-0

Download the SPSS Manual from Instructor's website. <http://www.csun.edu/%7Evcpsy015/home.htm>

The State of California is in the mist of a huge budget problem. As a result all instructors have been told not to enroll over the class limit. The class limit for this class is 74. Hence there will be a MAXIMUM of 74 students or less enrolled in this course. Do NOT request a Lab change. Labs are subject to the same limitations as specified. They WILL NOT BE Exceeded for ANY reason. If you are unhappy or unsatisfied with the lab you are enrolled in, or you are enrolled in a lab that does not fit your work or social schedule for the fall semester, please drop the entire 320/L course. If you have a time conflict with either lecture or lab courses with another class you are taking, you must decide which class you want to enroll in. The instructor will **NOT** sign or approve any form(s) allowing the student to take this course that conflicts with another class. If you drop this class or the lecture or if administration drops you from this course or lecture, the instructor will **NOT** give you permission to re-add the class. **NO student will be allowed to attend a different lab. Attendance will be taken. Any violators will be penalized 2 points for each infraction from the total point count at the end of the semester.**

Prerequisite for course is a passing grade in Math 140 or equivalent.

There is ONLY ONE grade given for both Lecture and Lab portions of the class. That is, the 320 lecture and 320 lab portions are taken as one FOUR UNIT class. Students are **not** permitted to take only the lecture portion or only the lab portion of the class. Emails to the instructor concerning one's grade or grading component will not be answered. The grading components and evaluation are.

Four (4) Exams	66 points (10, 15, 20, 21 points each, respectively)
Four (4) Lab Assignments	16 points
Textbook Check	1 point
Class Participation & Attendance	10 points
Instructor's Personal Evaluation	6 points
Completion and submission of agreement Form on Wednesday, August 26, 2009	1 point
TOTAL:	100 points (100%).

No Class /Lab Meetings on the following dates: Monday, September 7<sup>th</sup>, Labor Day, Wednesday, November 11: Veterans' Day.

The instructor is **not obligated** in any way to add students to the class even if there are vacancies. Some not-enrolled students think the instructor will eventually add them to the class if they continue to attend class. The instructor is NOT obligated and will NOT add such students. However, students seeking to add the course must present to the instructor official written evidence of satisfactory completion of the pre-requisites on demand. **If a waiting list** for adds is created by the instructor, students on that list must answer to every roll call. The failure to respond to roll call will result in a forfeiture of status on the waiting list. That student will no longer be considered. Any student who is administratively dropped by the university for any reason, (e.g. non-payment) will be placed at the end of the waiting list. The instructor will not give such students any special considerations for admission into the class. The instructor can refuse admission to any student. The instructor is not obligated to provide a reason. The instructor according to space availability will assign students who are added by the instructor to a lab. The instructor decides on which lab will be assigned to the student. The instructor determines the order of students on the waiting list. **If the student is unsatisfied with that assignment, the student will not be added to the class.** Enrolled students missing the first two classes at the beginning of the semester will be dropped from the entire 320/L class regardless of reason.

### The Signed Course Agreement

Each enrolled student MUST submit to the instructor in-person a signed copy of the course agreement form in order to remain in the class. Any student who has not signed and returned the agreement to the instructor or had someone else submit it will not be allowed to remain in the course. Students who are NOT enrolled in the class are NOT guaranteed admission into the class just because they have signed an agreement. If the instructor decides to grant admission to a student not enrolled in the class, the student must provide a signed agreement at the time permission to enroll numbers are given along with official written evidence of completion of the pre-requisites.

**Exams:** There will be 4 exams given in the class. Exams may be given during the lecture period OR the Lab period. It is the student's responsibility to find out the exact time of the exam. No final exam will be given. Exams are NOT directly cumulative but will require skills needed for earlier exams. **Only students properly enrolled in both lecture and lab portions of the class (student is enrolled in the lecture and lab taught by this instructor) will be allowed to take ANY of the exams.** If a student is enrolled only in the lecture or only in the lab, that student will NOT be allowed to take the exams and lab work. As a result these students will receive a grade of "WU" for the course they are enrolled in. A "WU" computes as an "F" grade. **WARNING!!! SOLAR will no longer allow students who are repeating the course to enroll in the class without permission of the instructor and if the class size has not been exceeded.** This means that if you get a "WU" for the class, SOLAR will NOT allow you to re-enroll for the class in subsequent semesters. The exams will be related to lecture and lab material. Due to budget cuts, the department will no longer provide resources for makeup exams. There will be **no make-up** exams. (Any request for a makeup exam will result in a point deduction from the total for the class). Missed exams will be given a score of zero. **A student who comes to an exam late will not be allowed to take the exam and will receive a score of zero for that exam.** You may use a hand-held calculator, but not a palm-pilot, ipod, cell phone or laptop or any electronic device that can store sentences or communicate by infrared or other wireless methods, during the exams. No cell phones or computers are allowed during the class and during exams. Exams include multiple choice, short answers, computations and manipulation of data, including calculations. Students are warned that if they do work using a pen, cross-outs or messy work (at the judgement of the instructor) will NOT be tolerated and will get the students a **zero score**. If you use ink, be sure to have white-out to correct your errors. Always bring your student photo ID to exams because identification may be checked. For ALL exams, each student is allowed to use his/her complete set of notes. Students during the exam can NOT share notes and calculators. Each student is responsible for bringing his/her own statistical tables. The statistical tables are considered as part of the notes allowed for the test. At the judgement of the reader, any illegible or poorly written or incomplete demonstration of solution on exams will result in **no credit** for that problem. Not following the rules exactly as given by the instructor on how to do a problem will result in a zero score for that problem. **No books** are allowed during the exam. No copy of pages from the book (except statistical tables) will be allowed during the exam. The 4<sup>th</sup> exam will be given during the last lecture class meeting of the semester, Wednesday, December 9<sup>th</sup> during regular class time or lab time. .

**List of questions and problems.** Posted on the web are 43 pages of study questions for the exams and lab assignments. No solutions are given and none will be given by the instructor. Students should download a copy of the questions and integrate them into the student's notes for the class. The instructor will most likely select some questions from this list for inclusion in the exams and lab assignments.

**LAB Assignments.** There are four (4) lab assignments. These Assignments are attached to this course syllabus. Each student is expected to complete them according to the instructions given for each. No late lab assignments will be accepted. No early submission of lab assignments will be accepted. If you are unable to be in class to submit your lab assignment, you may have a trusted friend or relative submit it for you. Be advised that submission of lab assignments is still the responsibility of the student. The instructor is not responsible for lost lab assignments. Do not submit the lab assignments under the instructor's door, in the instructor's mailbox or the psychology department office. Such submissions will be discarded and you will receive a **zero score**. Lab assignments submitted that are messy or unreadable (judgment of instructor) will be assigned a score of **zero** and returned to the student. These lab assignments will involve hand computations and the use of SPSS. Follow the instructions for each lab assignment carefully. Listed below is the proper format. Students are responsible for the following:

1. Your pages must be **stapled**. Don't trust someone else to keep your pages together. Do not use paper clips, tape, folds, and gum. These do not work.

2. In the **upper right corner** of every page put
  - a. Your full name
  - b. Your student ID number
  - c. date of submission
3. Clearly number problems
4. Answer the questions in the order assigned. The reader will not go looking for them.
5. Write clearly. If your writing is illegible, that may be hard to determine. Print if you have to.

**Tentative Exam Dates: Exam 1: Wednesday, September 9th, 2009, Exam 2: Wednesday, October 7th, 2009, Exam 3: Monday, November 9th, 2009. Please note these are tentative dates and the instructor may change them. Advanced notice will be given for changes.**

**Tentative Due Dates for Lab assignments are written on the lab assignments. These dates are also subject to change by the instructor.**

Letter grades for the entire course (lecture plus lab) will be assigned using the following scheme:

**The percentages are approximate but will not deviate by more than 1% in either direction:**

**A to A–: Top 14% total scores in the class**

**B+, B and B–: Next 27%**

**C+, C and C–: Next 35%**

**D+, D, and D–: Next 19%**

**F: Bottom 5%**

Note that your evaluation is based on the curve. This means that you are in competition with your classmates for grades. Your unnecessary cooperation with fellow students could elevate their grade over yours. Your rank in the class relative to other students determines where you fall on the curve. In a class with 74 students if you are at the top (Rank 1). You get an “A.” If you are at the bottom (rank 74<sup>th</sup>) you get an “F”. Be sure you fully understand what grading on the curve means before continuing in this class. Also note that the instructor finds your grade-point-average, your scholarships, your past performance in a quantitative course irrelevant in the assigning of your grade for this class. **If you have a high GPA and you do not want to put it in jeopardy, DO NOT TAKE THIS COURSE FROM THIS INSTRUCTOR.** Complaining about the difficulty of the course or the personality of the instructor will NOT improve your grade or change the structure of the class. If there are any components of the class that you do not like drop this course immediately and take it from another instructor.

### Housekeeping:

**Missed exams:** By definition, emergencies beyond a student's control are rare events. There will be no make-up exams given. There will be 4 regular exams given during the semester. There is no final exam. Any missed exams will be assigned a score of zero. **ALSO, students who are not properly enrolled in both lecture and lab taught by this instructor will NOT be allowed to take any of the exams and lab assignments. Those students who are only enrolled in the lecture portion or the lab portion of the class will be given a final grade of “WU” which computes as an “F” grade. No makeups are given for the four exams. No exams will be given on other dates other than the ones specified and stated by the instructor.**

**Grade appeals:** If you believe that a mistake has been made in grading your exam, write a note describing the error, attach it to the original exam, and give it to the instructor. You have 5 working days to do this starting from the day that the exams are returned to the students. If you do not attend class, you will have to obtain your exam from your instructor during the instructor's office hours. If you are ill or have some other circumstance that will prevent you from complying with this 5-day requirement, you need to discuss this with your instructor before or during this five-day period in order to make alternative arrangements. Appeals after 5 working days will not be considered. Please be advised that the multiple-choice portion of the exam is commonly copied before returning them to you and will compare the two when considering your appeal. If you have a concern about the exam grading, you must bring this to the attention of your instructor the day your exam is returned to you. Since grading of the exams is very straightforward, most difficulties arise due to failure to follow the rules and guidelines set by the instructor. If that is so, the appeal will be denied.

**Incompletes:** You must meet the following criteria before I can give you an Incomplete: (1) your work must be of passing quality throughout the course, e.g., your exams and lab assignments plus attendance are passing work (D grade or higher on a the specified grading curve). If you have not taken any of the exams or have not shown up to class on a regular basis (Instructor's Opinion) you are NOT considered to be passing the class. (2) You have an emergency beyond your control that you have documented to my satisfaction, and (3) you contacted me on or before the day of the last exam to arrange a conference. Please be aware that the instructor will NOT be around during the winter break so no completed work will be evaluated during that period of time. Students who are granted an incomplete will have two semesters following this semester in order to makeup the incomplete. If you have taken an incomplete grade for the class, do NOT re-enroll in the class. The instructor will not approve any extension regardless of the reason.

### **Tentative Order of Topics to be covered:**

- Normal Curve
- Derived Scores
- : Correlation
- : Prediction
- : Interpretative Aspects of Correlation and Regression
- The Basis of Statistical Inference
- Hypothesis Testing
- : Hypothesis testing: Two independent Means
- : Hypothesis Testing: Two Dependent Means
- : Inference about Correlation
- : One-Way Analysis of variance (ANOVA)
- Two-way ANOVA
- : Chi-Square
- : Nonparametric Statistics

**Computers, Cell phones and pagers:** Computers are NOT allowed during lecture. If you are the type of person who uses a computer to take notes, you need to take this course from some other instructor. Any student caught using a computer during lecture will be asked to drop the class. Failure to do so will result in a grade of "WU" which translates into an "F" grade. SOLAR will not allow any student who has taken and not passed Psychology 320/L to enroll in the class in future semesters. Students are asked to turn off their cell phones and their pagers during class time. Failure to do so may result in interrupting the class. If this situation occurs, the student responsible will be **penalized** at least two (2) points for each occurrence from the total score in the class. If the student is unidentifiable, every student in the proximity of the call phone noise will be penalized 1 point. If a cell phone rings during an exam, the **exam session ends for ALL** students. The student who is responsible for this violation will be given a **zero** on the exam and lose ALL points for class participation & attendance. All exams will be collected at that time. So be sure to turn off your cell phone or leave it with your instructor or exam proctor during examination periods or do not bring it with you. **ANY student caught texting or sending email or passing notes to one another during lecture or lab periods will be asked to drop the course or receive a "WU" grade in the class.**

**Class Attendance and Participation:** Ten percent of each student's grade is available for the student who attends class regularly without causing anguish and difficulties for the instructor and other students. Attendance will be taken on a semi-regular basis. If no response from the student is given at the time attendance is taken, 2 points will be deducted from the student's total score. Disruptions caused by the student during class time such as coming to class late will also result in a 2 pt. deduction. Attendance is definitely taken when exams are given or lab assignments are due and when exams and lab assignments are returned to the student. The Instructor's personal evaluation (6 percent of the final grade) of each student is a totally subjective assessment by the instructor of each student. Any student missing the last exam (except those with a legitimate incomplete; see above) will receive zero points for class participation and attendance and the instructors personal evaluation. Any student caught or suspected of cheating or plagiarizing will be given a **zero score** for that exam and also receive a zero

score for the class participation and attendance and personal evaluation components of the course. Note: There is NO makeup for points lost in this section. Coming to class and/or lab late will result in a deduction of points. **A student who comes late to an exam period will NOT be allowed to take the exam and will receive a zero score for that exam.**

**Students with stress, medical or other problems.** This is an extremely stressful class. If you are on medication or suffer from severe stress, please do not take this course from this instructor. There are other instructors who are a lot less stressful to the student. Please take this course (Psy 320/L) from them. No concessions or adjustments will be made to the class structure to accommodate students with medical, educational, or psychological issues other than those handled by organizations within the university, i.e. Disabled Students Center.

**Plagiarizing, Cheating and “Unauthorized” Cooperation.** Any student who places his/her name on work that was done by someone else will be considered as cheating. In the judgement of the instructor assignments submitted by students that appear to be a duplicate of one another will be considered as cheating. The instructor can at any time demand that the students involve submits their work to the online site [www.turnitin.com](http://www.turnitin.com) to determine if the students have cheated or plagiarized. For assignments where the student is considered to be cheating, a zero score will be assigned to ALL students involved. In addition, all students involved will receive a zero score on class participation and attendance. Students are encouraged to cooperate and help each other on assignments, however, such cooperation **must not be done in the view or presence of the instructor**. Any group of cooperative students who engage in such behavior will be given a **score of zero** on the assignment and a zero score on class participation and attendance. Additionally cheating and “unauthorized” cooperation will result in a **zero score** on the instructor’s personal evaluation. Cooperative activities must be done discreetly and away from the presence of the instructor. On exams, each student will do her/his own work and follow the rules set by the instructor. Failure to do so will result in a zero score for the exam.

**Agreement Form.** Attached to this course syllabus is the course agreement form. Each student must submit a signed copy of this form to the instructor on Wednesday, August 26th on or before 3 PM. The form is a signed agreement by the student certifying that the student has read this syllabus completely and that he/she understands the rules and regulations set by the instructor for the course. Any student who does not understand the provisions of this syllabus needs to ask for clarification from the instructor. **Any student who does not submit this form to the instructor must be prepared to drop the class or take a “F” grade in the course. Any of your exams will likely have questions on it that directly pertains to the course syllabus. Note: It is inappropriate for any student to submit the agreement form without reading the course syllabus in its entirety. Submitting the form during or immediately after the first class meeting will be met with suspicion and a likelihood of points deducted from one’s grade. Timely submission of a signed form is worth 1 point (1%) toward the final grade.** There is NO makeup for the loss of this 1 point.

In those situations where students are given a take-home exam or assignment, the instructor expects each student to work on her/his own. It would be considered cheating if students worked together on the take-home or out-of-class assignments. Any students caught working together on graded take home assignments or exams will receive a zero on that assignment or exam and also lose all points accumulated for the class participation and attendance portion of the class. Additionally, the instructor will give all students involved a **score of zero** on the personal evaluation portion of the class. The burden of non-cheating proof rests with the students involved.

**IMPORTANT:** The instructor will refer to formulas, examples and statistical tables given in the textbook. A **random check** (i.e. no warning will be given) to see if student has a copy of the **textbook** will be made some time during the semester. If the student passes the check, one point will be given to the student toward determining the final grade. There is NO makeup for the loss of this point. Student absent when this check is made will receive 0 (zero) points.

### **Some important rules to maximize your grade in the class.**

#### Basic Rules for the Class

1. Attend ALL lectures and scheduled lab meetings. Attendance will be taken on an irregular basis.
2. Follow Instructor’s Instructions Exactly

3. There is **NO** creativity in this course. Do **NOT** make up your own rules. This is a statistics course and not an art class. The instructor gives specific rules that you need to follow. Failure to do so will result in a zero score for the lab assignment and exams. This will be enforced strictly this semester.
4. The instructor will show you all of the steps and work in doing a problem correctly. You must show the same steps and the same work in your computations. Steps that are left out will result in a ZERO score for that problem even if you have the correct answer. For example, in computing the Centile Rank, if the formula is left off, you will receive no credit. If you present your final answer of a scaled score without showing clearly the decimal answer and the rounding used, you will receive no credit.
5. You must have a calculator capable of doing statistical computations quickly. Such calculators are available for \$9 or less at various places. Ones by TI and Casio are fine. These calculators have special function keys to compute the mean and standard deviation. **Each student is expected to know** how to access these special functions on her/his calculator. The instructor or instructional assistant is NOT responsible for teaching a student how to operate his/her calculator.

Rules for Hand Computations. Violation of any of these rules when doing hand computations will result in no credit given. There will be **no “learning curve” period.** Any violation of these hand computational rules will result in a zero score.

1. Your answer must **agree exactly** with the one computed or arrived at by the instructor. Inability to do so will definitely result in points deducted.
2. Carry three (3) decimal places for ALL of your computations. Exercise rounding rules **ONLY** at the end of the computational problem. Failure to do so will result in **no credit** given for the question/problem regardless of whether you arrived at the solution that agrees with the instructor's.
3. For centiles (or percentiles), CEEB, deviation IQ, and McCall T-score scaled scores, the final answer is expressed as an integer (whole number; no fractions). At the end of the computation for these scaled scores, round to the nearest whole number (no decimals). Failure to round these to whole numbers will result in no credit given. Inadequate demonstration of rounding will also result in no credit given.
4. Centiles (or percentiles) are RANKS. Even though they are interpreted in terms of percentages, they are NOT percentages. Do NOT attach a percentage sign to a centile, percentile, centile rank or a percentile rank.
5. Z-scores, or standard scores are computed using numbers that are carried to 3 decimal places. They are reported to 2 decimal places. So if you need to report a Z-score, round it to 2 decimal places. However, if a Z-score is used in an intermediate step to arrive at another statistic, such as a scaled score, keep it at 3 decimal places.
6. For final answers involving percentages, they are reported as is. Do not round them to a whole number. A percentage symbol is attached to these.
7. For correlations and regression equations, 3 decimals are also carried in all computations. Correlations and regression coefficients are reported as a final answer to 2 decimal places. However, if the correlation and/or regression coefficients are used in the computation of another statistic, they must be used with 3 decimal places. If correlations and regressions, as a final answer, are not reported and rounded to 2 decimal places, no credit will be given.
8. If the problem requires you to compute a quantity that is generally reported as a whole number, such as the number of cases, or a predicted test score, these are rounded and reported as whole integer numbers.
9. The formula used to compute the standard deviation for this course will be

$$S = \sqrt{\frac{\sum (X - M)^2}{n - 1}} = \sqrt{\frac{n \sum X^2 - (\sum X)^2}{n(n - 1)}}$$

It is assumed that each student in the course have successfully completed the pre-requisite course and familiar with using formulas such as these. Failure to use these formulas or use these formulas correctly will result in no credit.

Other useful formulas (more will be given during the semester):

$$\text{Mean: } M = \frac{\sum X}{n} \quad \text{Standard Score: } Z = \frac{X - M}{S} \quad \text{Percentile: } Pr = \frac{Ra - .5}{N} \times 100$$

$$\text{Correlation: } r_{XY} = \frac{\sum XY - N \times M_X M_Y}{N \times SD_X SD_Y} \quad \text{where } X = \text{first variable, } Y = \text{second variable}$$

$$\text{Regression: } Y' = r \left( \frac{S.D._Y}{S.D._X} \right) X + \left( M_Y - r \left( \frac{S.D._Y}{S.D._X} \right) M_X \right)$$

**If you are unable to comply with these important rules, drop this course immediately** and take it from someone else where these rules are NOT important to them. Reminder: Friday of the 3<sup>rd</sup> week is the last day to drop the course without instructor's approval. I will not sign any drop sheets after that deadline unless the reason is well documented; is within the rules of the university and meets with my approval. Note: the recommendation for students to take this course from other instructors is an endorsement and not a criticism or evaluation.

### Psychology 320/L: Psychological Statistics Lab Assignments. Fall Semester 2009

**Be sure to follow ALL of the rules for submitting your work as written and delineated in the course syllabus.**

#### Assignment 1. (4 pts.) Show ALL work to obtain full credit.

Tentative Due Date: Wednesday, September 2nd, no later than 3 PM

##### 1. An hour examination in social psychology produced the following scores:

83	91	87	82	81	84	62	93	50	63
96	68	73	80	97	95	91	38	82	72
88	83	78	93	69	78	91	87	84	88

- Compute the mean and standard deviation for this set of scores using your hand calculator.
- Pick 4 different scores and convert each of the chosen scores to a Z-score using the mean and standard deviation found in part (a).
- Convert the raw score  $X = 88$  to a deviation IQ (Stanford-Binet) scaled score
- Find the centile rank for a score ( $X = 87$ )
- Convert the raw score  $X = 81$  to a CEEB scaled score

2. The scores on a nationally given mathematics test are normally distributed with a mean of 80 and a standard deviation 13.

- What percentage of scores falls between 64 and 90?
- What percentage of scores falls between 60 and 70?
- What percentage of scores falls above 92?

#### Assignment 2 (3 pts.). Show ALL work to obtain full credit.

**Tentative Due Date: Wednesday, September 30th, no later than 3 PM. SPSS is not needed for this assignment.** All computations are done by hand with a calculator.

- "Grading on a curve" is defined as a method for assigning grades using the normal distribution. A large social psychology class at a Big Ten school used this method. With 352 students taking the test, the mean score was 62 and the standard deviation was 11.5. If ten percent of the class receives "A's", what is the lowest raw score that receives an A?
- Student E was told that she received a raw score with an equivalent percentile rank of 72. Assuming a normal distribution, what would be E's raw score if the distribution of raw scores has a mean of 82 and a standard deviation of 12?

3. A statistics professor conducts a study to investigate the relationship between the performance of his students on exams and their anxiety. Ten students from his class are selected for the study. Just prior to the final exam, the students are given an anxiety questionnaire. The data are given below:

Student	1	2	3	4	5	6	7	8	9	10
Anxiety	28	41	35	39	31	42	50	46	45	37
Exam	82	58	63	89	92	64	55	70	51	72

- Find the Pearson product moment correlation.
- Find the least squares equation for predicting final exam scores using anxiety level.
- Compute the sum-of-squares residual.
- How much of the variance between anxiety and exam performance is shared or in common?

**Assignment 3: (4 pts.) Tentative Due Date: Wednesday, October 28<sup>th</sup> (No later than 3 PM)**

The following problem is to be completed using SPSS. Be sure to mark, circle clearly the answer on your SPSS Output. Any SPSS output submitted without a clear indication of the answers will NOT be counted. Include a printout of the data entry.

1. A neuroscientist suspects that low levels of a brain neurotransmitter serotonin may be causally related to aggressive behavior. To study this, she obtains 9 rhesus monkeys. The monkeys are observed daily for 6 months and the number of aggressive acts are recorded. Serotonin levels in the striatum are also measured daily for each animal. The number of aggressive acts and serotonin levels are computed for each animal and are presented below:

Subj #	1	2	3	4	5	6	7	8	9
Serotonin	0.32	0.35	0.38	0.41	0.43	0.51	0.53	0.60	0.63
Acts	6.0	3.8	3.0	5.1	3.0	3.8	2.4	3.5	2.2

- Find the regression line that predicts the number of aggressive acts from serotonin levels.
- Based on these data, what is the predicted number of aggressive acts if a rhesus monkey had a serotonin level of 0.46 mg.? (This one is done through hand computations. The solution must be clearly marked.).
- Compute the standard error.
- compute the coefficient of determination

The computations for the following problems (2, 3 and 4) must be **done by hand**. Be sure to clearly layout the five steps of hypothesis testing. Show ALL work.

2. A Psychology 321 class was randomly divided into two groups. Six participants found their reaction time (RT) to an auditory "go" signal and their RT to a visual "go" signal. Seven participants found their RT first to the visual signal and then to the auditory signal. The scores for each person are arranged in rows for the 13 members of the class. All values are in seconds.

Auditory RT	0.19	0.23	0.14	0.19	0.18	0.21	0.18	0.17	0.17	0.16	0.19	0.17	0.16
Visual RT	0.17	0.23	0.20	0.19	0.19	0.22	0.23	0.16	0.21	0.19	0.18	0.20	0.19

- Write the null and alternative hypotheses in statistical terms
- Compute the value of the test statistic
- State the decision rule using  $\alpha = .05$  and the decision.
- What is your conclusion?

3. It has been reported that employment interviewers spend more time talking to applicants who are eventually hired than to applicants who are rejected. To determine whether this is true for college students, a student researcher persuaded 22 friends to pose as an applicant went to 22 job interviews (one person per interview). A record of the duration and outcome are given below:

Hired (# of minutes in interview)	29	25	20	26	21	26	22	27	19	21	25
Rejected (# minutes in interview)	17	20	15	26	13	18	20	17	16	14	20

- State the null and alternative hypothesis in statistical terms
- Compute the test statistic (use backside)
- State your decision rule using  $\alpha = .05$  and decision
- What is your conclusion?

4. A researcher is interested in determining if an enriched environment increases the number of branches in dendrites in experimental rats. Previous research has shown rats with no enrichment have an average of 12.45 branches per dendrite. In the current research, 10 rats were given 20 minutes of an enriched environment (e.g. toys, exercise, etc.) each day for 60 days. At the end of 60 days one dendrite was extracted from each rat without harming the rat and the number of branches were counted. The results were 12, 15, 18, 12, 22, 18, 21, 16, 14, and 20. Conduct the appropriate hypothesis test to determine if an enriched environment increased the number of branches of dendrites. Use  $\alpha = .01$ .

**Assignment 4 (5 points). Tentative Due Date: Wednesday, December 2<sup>nd</sup>. (no later than 3 PM)**

Instructions: Perform the appropriate hypothesis test for each problem given below. **Question 1** involves hand computations only. Show your work. **Question 2** uses SPSS for computations only. Be sure to include SPSS output and **CLEARLY CIRCLE** the appropriate places used for steps 3 and 4. Also include the SPSS data table used in SPSS.

1. An experiment is conducted to examine the overall effectiveness of three training programs X, Y, Z, in training the soldering of electronic components to a printed circuit board. Fifteen trainees are randomly assigned to the three programs (five in each). After completing the course, each trainee is required to solder components onto four P.C. boards. The number of errors is recorded. One trainee withdrew from group X and two trainees dropped out from group Y. The data are presented below.

Training program	Number of errors				
X	6	7	6	5	6
Y	5	6	5	6	
Z	6	6	7		

Conduct the appropriate hypothesis test using the data given above at  $\alpha = .05$ . Hand computations only.

- Ignoring the F-test, use the Scheffé method to test all possible pairwise comparisons. Use  $\alpha = .05$
- Ignoring the F-test, use the Tukey method to test all possible pairwise comparisons. Use  $\alpha = .05$
- What can you conclude as a result of these tests?

2. To determine if a relation between an inferred hemispheric style and problem-solving performance exists, participants were classified as having preferences of left, integrated, or right hemispheric style on the basis of scores on Your Style of Learning and Thinking. Participants were then asked to solve the seven disk Tower of Hanoi problem. The researcher recorded the number of moves it took to solve the problem. The data are provided below. **Use SPSS for computations.**

Hemispheric Preference		
Left	Integrated	Right
238	194	176
206	207	185
224	213	210
225	226	189
229	208	211
195	195	186
213	191	196
191	203	205
248	209	210

- Develop the appropriate hypothesis test to determine if difference hemispheric preference leads to different problem solving speed. Use  $\alpha = .05$ .
- Ignoring the F-test, use the Scheffé method to test all possible pairwise comparisons. Use  $\alpha = .05$
- Ignoring the F-test, use the Tukey method to test all possible pairwise comparisons. Use  $\alpha = .05$ .
- What can you conclude as a result of these tests?

Psychology 320 and 320L  
Psychological Statistics  
Fall Semester 2009  
Agreement Form

I, \_\_\_\_\_ certify that I have read this entire course syllabus and that I **fully understand and agree** to abide by all the rules, requirements and policy set forth by the instructor, department, college and university. The instructor has discussed the content of the syllabus in class. He has also informed every student in attendance that he will answer all questions concerning the syllabus and the course content during the semester.

I also understand that the any exam given in this course could cover material from the course syllabus.

This form must be signed and dated This form must be signed and dated by me and submitted to the instructor on Wednesday, August 26, 2009, no later than 3 PM. My failure to do this will result in the forfeiture of my enrollment in the class.

Signature \_\_\_\_\_

Print Your Name \_\_\_\_\_

Date \_\_\_\_\_