

Please do not put your name anywhere on the exam.

1. Clearly identify each of the following:
(2 points each)

- a. Huynh-Feldt Correction
- b. Cohen's d
- c. Operational Definition
- d. Random Effect Independent Variable
- e. Orthogonal Polynomial
- f. Simple effect
- g. Winsorizing

2. For each of the following, indicate the appropriate procedures necessary.
(2 points each)

a. A licensed psychologist diagnoses 25 children as having an attentional disorder, a reading disability, or a pervasive developmental disorder. A psychology intern under her supervision classifies the same children, without knowing the supervisor's designations. To what extent did they make the same classifications, beyond chance?

b. A researcher believes that middle-income individuals hold more conservative attitudes about sexuality than do lower-income or higher-income individuals.

c. A researcher conducts a 2x3 gender-by-time mixed-model ANOVA. Detecting a significant interaction, he wishes to compare the six means from the interaction.

d. Forty students are assigned randomly to the cross of two fixed effect independent variables, 1.) gender of target and 2.) provocation

(3 points)

3. Through pilot testing, a researcher identifies the minimum and maximum temperatures during the molting season of the diamond-back rattlesnake. He lets his computer randomly select 5 different temperatures within this range, then randomly assigns 40 snakes to one of the 5 temperatures (8 per temperature). He measures duration of molt. He analyzes the data with one-way ANOVA, treating temperature as a fixed effect. Comment.

(3 points)

4. A student researcher had measured 150 students' attitudes about NASA in December, and then measured those same students' attitudes again in mid-February, shortly after the Columbia disaster. He reports the degrees of freedom are 1,149. His advisor asks why he has not corrected the degrees of freedom with epsilon. Comment.

5. Examine the following portion of an SPSS printout and...
(4 points each)

Descriptive Statistics

Dependent Variable: SCORE_3

GENDER	Mean	Std. Deviation	N
1	4.61	2.99	18
2	4.00	2.30	18
Total	4.31	2.65	36

Tests of Between-Subjects Effects

Dependent Variable: SCORE_3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.361 ^a	1	3.361	.472	.497
Intercept	667.361	1	667.361	93.654	.000
GENDER	3.361	1	3.361	.472	.497
Error	242.278	34	7.126		
Total	913.000	36			
Corrected Total	245.639	35			

a. R Squared = .014 (Adjusted R Squared = -.015)

- show how to calculate the empirical power of the test
- show how to calculate n for 80-90% power
- show how to calculate η^2

(4 points)

6. Show how you would compute the skew of the following sample: 2, 3, 3, 4, 4, 5, 21

Descriptive Statistics

	N	Mean	Std. Deviation
VAR00002	7	6.0000	6.6833
Valid N (listwise)	7		

7. A researcher computed Cohen's Kappa for two judges' agreement about 4 categories. Show how to find $\sum f_E$

(4 points)

JUDGE1 * JUDGE2 Crosstabulation

Count		JUDGE2				Total
		1	2	3	4	
JUDGE1	1	4	2	1	2	9
	2	1	7	1	1	10
	3	1	2	15	1	19
	4	2	1	1	8	12
Total		8	12	18	12	50

Your answers to the questions below should be hand-written on this examination page.

"Evidence" and "Support" refer to statistical information that you would *select* from your SPSS analyses to report in a paper such as means, F ratios, p values. As you would do in a paper, present only **relevant information** but be sure that your information **completely** answers the question. [e.g., "see SPSS printout" is insufficient] **Please do not ask what the "relevant evidence" is: Your ability to make that determination is part of the test!!!**

IN ADDITION, please label your SPSS output file *surname.spo* (e.g., mine would be *ruscher.spo*) **and** save it to your disk. I will use output files to ascertain whether you performed the analysis correctly and, when appropriate, to award partial credit.

The data set comprises 54 cases of 8 variables, which are:

id	- identification number 1-54
stress	- between subjects fixed effect IV, manipulated level of stress 1=low, 2=moderate, 3=high
educatio	- between subjects fixed effect IV: higher education obtained 1= 1 year of college completed 2= 2 years of college completed 3= 3 years of college completed 4 = 4 years of college completed 5 = 1 year of grad school completed 6= 2 years of grad school completed 7= 3 years of grad school completed
company	- 1=library ; 2=electronics store
jobtitle	1=clerkI 2=clerkII 3=librarian 4=sales rep 5=asst manager 6=manager
expect	- self-reported expectations of success, in terms of percent expected right, range 0-100
perform	- actual performance out of 25, range 0-25
charity	- dollars/week donated to charity

1. The researcher predicts that participants with more education expect a higher probability of success at the task (*expect*). Specifically, she wishes to compare to groups: people with some graduate-level education versus people who have not had any graduate-level education.
 - a. Test the researcher's hypothesis with ANOVA, and present evidence bearing on it.
(7 points)
 - b. How much power did the researcher have to test this hypothesis?
(2 points)
 - c. What sample size would have given her study 80% - 90% power?
(2 points)

2. The researcher hypothesizes that performance is good under moderate levels of stress, relative to low and high levels of stress.
Test the quadratic trend of *stress* on *perform* then present appropriate evidence bearing on the researcher's hypothesis
(7 points)

3. The researcher predicts a difference in charitable contributions as a function of company. Job titles are nested within companies. Test the researcher's hypothesis using nested models ANOVA, present evidence bearing upon it, and draw appropriate conclusions.
(6 points)

Please do not put your name anywhere on the exam.

1. Clearly identify each of the following (Note: I expect words here, not just formulas. You should be thinking: what is it, what does it do, for what is it used?)

(2 points each)

- a. semi-partial correlation
- b. heteroschedasticity
- c. range restriction
- d. multicollinearity
- e. moderator variable
- f. multiple R

2. For each of the following, indicate the appropriate procedures necessary. Note: please recognize that "correlation" or "regression" is unlikely to be an adequate response.

(3 points each)

a. A researcher is interested testing the effect of diversity training on ratings of outgroup job applicants, a function of social dominance orientation. Participants whose aggregate scores from the 24 items Social Dominance Inventory are assigned randomly to attend a diversity training workshop or control workshop. One week later, participants rate the qualifications of three job applicants: one who is clearly an outgroup member, one who is clearly an ingroup member, and one whose group membership is ambiguous.

b. A researcher predicts that parental conflict reduces children's optimism about marital success, which in turn predicts the duration of the first romantic relationship in college. Among college-bound high school seniors, he assesses degree of parental conflict from parents' reports, and also assesses the high school seniors' optimism about their own future marital success. Two years later, he asks students to report upon the length of their first romantic relationship since beginning college.

c. A relationships researcher is interested in the extent to which cross-sex friends have similar construals of their relationship, across different relationship domains. Each friend is asked how much time the pair spend performing platonic recreational activities (e.g., playing videogames) and how much time the pair spend talking and disclosing. The researcher expects to find a stronger relation in friends' reports of recreational activities than their reports of talking.

3. Examine the following output, comment on what was found, and give an interpretation. (3 points)

Correlations

		B	C	D	E	F	G	H
B	Pearson Correlation	1.000	.605*	-.091	-.174	.816*	.012	.741*
	Sig. (2-tailed)	.	.000	.537	.237	.000	.934	.000
	N	48	48	48	48	48	48	48
C	Pearson Correlation	.605*	1.000	-.028	-.315*	.494*	.100	.376*
	Sig. (2-tailed)	.000	.	.851	.029	.000	.499	.008
	N	48	48	48	48	48	48	48
D	Pearson Correlation	-.091	-.028	1.000	.102	-.107	.026	-.077
	Sig. (2-tailed)	.537	.851	.	.490	.469	.862	.601
	N	48	48	48	48	48	48	48
E	Pearson Correlation	-.174	-.315*	.102	1.000	-.186	-.116	-.137
	Sig. (2-tailed)	.237	.029	.490	.	.207	.432	.354
	N	48	48	48	48	48	48	48
F	Pearson Correlation	.816*	.494*	-.107	-.186	1.000	-.032	.833*
	Sig. (2-tailed)	.000	.000	.469	.207	.	.830	.000
	N	48	48	48	48	48	48	48
G	Pearson Correlation	.012	.100	.026	-.116	-.032	1.000	-.003
	Sig. (2-tailed)	.934	.499	.862	.432	.830	.	.985
	N	48	48	48	48	48	48	48
H	Pearson Correlation	.741*	.376*	-.077	-.137	.833*	-.003	1.000
	Sig. (2-tailed)	.000	.008	.601	.354	.000	.985	.
	N	48	48	48	48	48	48	48

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.499 ^a	.249	.215	9.8271	.249	7.445	2	45	.002

a. Predictors: (Constant), H, F

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1437.969	2	718.985	7.445	.002 ^a
	Residual	4345.697	45	96.571		
	Total	5783.667	47			

a. Predictors: (Constant), H, F

b. Dependent Variable: C

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics		
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF	
1	(Constant)	14.974	5.865		2.553	.014						
	F	1.135	.448	.592	2.536	.015	.494	.354	.328	.306	3.268	
	H	-.652	1.296	-.118	-.503	.617	.376	-.075	-.065	.306	3.268	

a. Dependent Variable: C

(3 points)

4. A professor believes that SAT-Q (i.e., the quantitative part of the SAT), grades in Psyc212, and first-year college gpa should predict grades in Psyc611. Cleverly avoiding the chair of the Institutional Review Board, she obtains all of this confidential information about her 16 Psyc611 students, and proceeds with her analysis. Leaving ethics aside, describe at least two serious statistical issues that are likely to compromise the validity of her results.

(5 points)

5. A research conducts moderated multiple regression with a dichotomous predictor x1, a continuous predictor x2, and the interaction term x3. The dichotomous predictor was coding -1 +1, and the continuous variable was centered prior to creating the interaction term. The resulting regression equation is:

$$y' = 7 + 2X_1 + .25X_2 + 4X_3$$

He now wishes to plot the interaction, which requires finding the equations for the simple slopes. Show how you would find those equations.

(5 points)

6. Using these print-outs from a test of mediation, show the test of the indirect path.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.154E-02	1.244		-.074	.942
	H	1.255	.168	.741	7.481	.000

a. Dependent Variable: B

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-5.540	1.750		-3.165	.003
	H	2.411	.236	.833	10.214	.000

a. Dependent Variable: F

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.018	1.172		1.723	.092
	H	.337	.259	.199	1.301	.200
	F	.381	.089	.651	4.258	.000

a. Dependent Variable: B

(4 points)

7. Imagine that your best estimate of rho is .20. What sample size would give you at least any 80% chance of detecting that relation beyond chance?

(4 points)

8. Using the information from the correlation matrix, show how you would find:
- the partial correlation of prejudice and attentio (partialling contact out of both)
 - the semipartial correlation of prejudice and attention (partialling contact out of prejudice)

Correlations

		CONTACT	PREJUDIC	ATTENTIO
CONTACT	Pearson Correlation	1.000	-.003	.157
	Sig. (2-tailed)	.	.988	.464
	N	24	24	24
PREJUDIC	Pearson Correlation	-.003	1.000	-.398
	Sig. (2-tailed)	.988	.	.054
	N	24	24	24
ATTENTIO	Pearson Correlation	.157	-.398	1.000
	Sig. (2-tailed)	.464	.054	.
	N	24	24	24

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IN ADDITION, please label your SPSS output file *surname.spo* (e.g., mine would be *ruscher.spo*) **and** save it to your disk. I will use output files to ascertain whether you performed the analysis correctly and, when appropriate, to award partial credit.

The data set comprises 50 cases of 6 variables, which are:

id	- identification number 1-50
citrural	- between subjects fixed effect IV of participant's residence -1 = urban; +1 = rural
sdo	- composite score on an 8-item measure of social dominance minimum 8 ; maximum 40
ses	- socioeconomic status, tens of thousands of dollar per annum income e.g. 8 signifies 80,000/year
donat_m1	- average donation to charity per week, 2001
donat_m2	- average donation to charity per week, 2002

1. The researcher wishes to examine the unique contributions of SDO and SES on 2002 charitable donations (DONAT_M2). Run the usual diagnostics (you should know what they are) that you would examine prior to interpreting the analysis, and comment about each of them.

2. Test the hypothesis that SDO moderates the relation between residence (CITRURAL) and 2002 charitable donations (DONAT_M2). Don't bother with the snooping requested in #1...just assume everything is clear and clean. Be sure to report the information that bears upon this hypothesis.

Please answer the following questions on your own paper. You may answer the questions in whatever order you please, but please be certain to label in a clear fashion (e.g., A1, B5, B6, A10). I cannot award credit easily if I cannot find the answer.

You may use books, notes, manuals, calculators, formulae, old tests, SPSS printouts, and *almost* anything else that you believe will be helpful. The only prohibitions are a.) no communication with anyone (e.g., classmates, friends in the bathroom) by any mode (e.g., email, morse code, cell phone) and b.) no computers. You have 4 hours. Short, solitary restroom breaks are fine; prolonged sabbaticals are prohibited.

Part A.

These questions involve identifying the appropriate procedure(s). Be specific, and make sure that you answer the question in its entirety. **Please respond to exactly 10 of the 12 items. (If you respond to more than 10, I will take your first 10...so choose with wisdom).**

A1. A university administrator is interested in hours per week allocated to TA duties, as a function of year in graduate school and department. He randomly selects 5 first-year, 5 second-year, 5 third-year, and 5 fourth-year doctoral students on TA from each of the following departments: chemistry, history, psychology, sociology, and english. How should these data be tested?

A2. A researcher is interested in the unique effects of relationship length and partner's physical attractiveness on men's relationship satisfaction. Which analysis and resulting information would answer this question?

A3. A graduate student is interested in the effects of gender on pronoun use. She audiotapes ten men and ten women who each provide a one sentence description of the room in which they are sitting. Pronouns are categorized as either first person (e.g., I, we), second person (e.g., you), third person (e.g., they, she), or no pronoun used. What's her next step?

A4. In a sample of 90 grade-school children, a researcher finds that the relation between age and disinhibition is .43. A colleague working with 100 grade-school children in a different school district finds that the relation is .66. Are these relations different across district?

A5. A published article reports a statistically significant relation between job satisfaction and organizational citizenship behavior is .50. A new researcher wonders if her sample of 40 individuals will provide sufficient opportunity also to detect a significant relation. What to do, what to do?

A6. A student predicts that a certain behavior will increase steadily for girls over 5 time periods, but will hold relatively constant for boys. How should these data be analyzed and interpreted?

A7. A rat-runner (sorry, Jesse) randomly assigns rats to a drug injection or a control injection, then subjects them to a water maze task. Her p is .0001, and she wants to be able to talk meaningfully about the magnitude of the drug's impact on behavior. Well?

A8. A researcher examines the effect of stereotype threat on performance, as a function of group identification. She selects 40 highly group-identified individuals and randomly assigns them to threat. She does the same with 40 poorly group-identified individuals. How will these data be analyzed, from start to finish?

A9. A seasoned social psychologist believes that sad mood causes people to think about negative characteristics of a persuasive message, and that ultimate change in attitudes depends necessarily on this mental focus. How will these data be analyzed, from start to finish?

A10. A preliminary exploration of the data from one variable yields some serious skew. What steps might you take to deal with it?

A11. A researcher is interested in the relation between body image consciousness and negative generalized metaperceptions (i.e., beliefs that others view one negatively). She assesses body image using an established aggregate measure of body image, obtains a rating on a 7-point scale on generalized metaperceptions. Recognizing that being overweight could add unwanted noise in the analysis, she also indexes height-to-weight ratio to include in the analysis.

A12. A researcher has one between subjects variable (with 2 levels) and one within subjects variable (with 4 levels). How many F s will be computed *and* for which of those F s will the df be adjusted by epsilon (assuming violation of sphericity)?

Part B.

Interpret the outcome or output. For some of the problems, you may need to identify incorrect findings, steps, or interpretations of the researcher. (So don't just race through these) **Please respond to exactly 5 of the 7 items. (If you respond to more than 5, I will take your first 5...so choose with wisdom).**

B1. A researcher decides to covary intelligence in her examination of whether Kaplan courses increase scores on the SAT. Participants either take a Kaplan-like course, a course with different features, or no course, and then they take an SAT-like test. She tests the intelligence-by-course interaction, and finds that it is significant. What's the deal?

B2. Sal examines whether attachment-related avoidance and gender predict complexity in mental model of romantic partner. Avoidance is measured using Brennan and Shaver's 24 item survey on which participants may respond from 1 to 7; gender is measured by self-report. Complexity is measured using Linville's H-value, which counts the number of dimensions used to describe the partner as well as the uniqueness of the descriptors. Sal reports the R^2 as .49, and the F-test for the regression as $F(1,198) = 190.235, p < .001$. He also reports the b for avoidance as 34.15, $p < .01$ and the b for gender is 5.08, $p < .05$. Sal's colleague is puzzled by the report.

B3. A research team has decided to use multiple regression to analyze their data of 2000 cases. They have 4 levels of one categorical between subjects variable, and one continuous predictor. Their clever graduate student performed the analysis, and has now left the country. This graduate student indicated how many predictors he entered in the regression analysis and also reported a set of F values for ΔR^2 . To the team's chagrin, the number of predictors entered do not match the number of F values. How many should there be of each (i.e., predictors and F values)?

B4. Two collaborators are having an argument. P wants to treat windspeed and temperature as random effects independent variables; G wants to treat them as fixed effect independent variables. You are the "arbitrator." What questions would you ask them, and under what conditions would you agree with G versus P?

B5. Your quasi-sloppy research assistant provides the following portion of a print-out. You want to know R^2 , but don't want to send him back down the hall to run the whole analysis again. (Besides, you can impress him with your statistical prowess).

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57.135	2	28.568	34.726	.000 ^a
	Residual	38.665	47	.823		
	Total	95.801	49			

a. Predictors: (Constant), HAM, GR_EGGS

b. Dependent Variable: LIKEIT

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.210	.433		9.727	.000
	GR_EGGS	.105	.015	.734	7.243	.000
	HAM	-.740	.111	-.679	-6.699	.000

a. Dependent Variable: LIKEIT

B6. A researcher examines the effects of mood on decision-making. Participants render a decision to hire or not hire job candidates. Prior to the first decision, participants are insulted. Prior to the second decision, participants are complimented. Prior to the final judgment, participants are made to feel guilty. What do you make of the design of this study?

B7. Given the output below, would the researcher test the indirect path of whether samIam mediates the relation between green eggs and ham? Why or why not?

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.729	.616		4.433	.000
	GR_EGGS	5.298E-02	.018	.403	3.024	.004
	SAMIAM	-3.183E-02	.070	-.061	-.457	.650

a. Dependent Variable: HAM