ISU 580 Final Exam
Closed Book, Closed Notes, 2hrs max

Name _____

When asked to specify a "Study Design" please refer to the following list:
Ethnographic, Descriptive, Correlational, Demonstrative, Between-Subjects Experimental, Within-Subjects Experimental
You may modify these with the following prefixes:
Univariate, multivariate, N-factor, N-level (for integer N).

When asked what statistics you would use, be as specific as possible, e.g., "Mean and standard deviation of nose-picking frequency" or "One-way ANOVA on scream intensity with nose-twist and eye-poke devices as independent factors."

When asked "What kind of test is this?", choose from the following list:
t-test for independent means, t-test for dependent means, Chi-square goodness-of-fit, one-way ANOVA, multi-factor ANOVA, Pearson correlation

When asked for a "Research Model", draw a boxes and arrows diagram depicting variables and their relationships. Label the boxes with the role of the variable(s) contained (IV, DV, etc.) as well as the name(s) of the variable(s).

When asked to "Interpret the results" of a test, you should write the results in both English and publication format. Example: "There were no significant differences in performance between the Jacuzzi and Sauna groups, t(42)=5.67, n.s."

1. Descriptives, etc. For each of the following measures, check off all statistics that may be appropriate to use. Assume interval and ratio measures are approximately normal unless noted. (5%)

	Mean	Median	Mode	StdDev	Inter-quartile range
1a. Performance (time to complete).					
1b. Political party affiliation.					
1c. Socioeconomic status.					
1d. Likert scale, with a significant skew in the data.					
1e. Weight loss, with a bi-modal distribution.					

2. Power, etc. (10%)

a) Define 'level of significance' of a statistical test (aka 'p' value) for a layperson.

_____

_____

_____

_____

2. Power, etc., continued

b) How are p and α related?

_____

_____

c) Given α, β, power, d (effect size) and number of tails in your test criteria, what is the likelihood that you will make an incorrect conclusion regarding your research hypothesis?

_____

_____

d) You conduct a pilot study comparing two word processors, using two different measures of satisfaction, in order to inform a power analysis. The first measure ("LoveOfWord") shows a difference of 2.3 σ between groups, while the second ("OfficeAttraction") shows a difference of 1.1 σ. Assuming the measures have similar reliability and validity, which would you use in your main study? Why?

_____

_____

_____

3. Study Designs. You want to determine if use of dominant hand affects picture quality when using your new digital camera. You bring 30 volunteers into your lab. You first ask each person if they are right or left handed, then use duct tape to immobilize the dominant hand in half the group and the non-dominant hand in the other half (randomly assigned). You then give them your camera and ask them to go home and take 10 pictures during the next day. When they return, the alternate hand for each volunteer is immobilized and they are sent home again for another day to take another 10 pictures. Picture quality is assessed by a panel of two professional photographers. (8%)

3a. What kind of study design is this? _____

_____

3b. What statistics would you use?

_____

_____

_____

_____

3c. Draw the research model.

4. Study Designs. You want to study the relationship between user personality and time spent online, so you construct a survey and administer it to every 5th person who walks into a computer store for a two-hour period. Personality is assessed using a validated composite 12-item Likert scale of introversion / extroversion; time spent online is assessed by asking "How many hours do you spend online in a typical week?". (8%)

4a. What kind of study design is this? _____

_____

4b. What statistics would you use?

_____

_____

_____

_____

4c. Draw the research model.

5. Study Designs. You've just developed a new software application for infants to teach them sign language (Babysign), and just signed with Gooboo baby food for a co-marketing deal. You want to demonstrate that infants who use your software *and* eat Gooboo grow up with a higher level of intelligence. You recruit 120 families with newborns, randomly divide them into four groups: Group1=no Gooboo, no Babysign; Group2=Gooboo, no Babysign; Group3=no Gooboo, Babysign; Group4=Gooboo and Babysign. After a year using the assigned products you assess IQ (interval measure) using a standard procedure. (8%)

5a. What kind of study design is this? _____

5b. What statistics would you use?

5c. Draw the research model.

6. **Data Screening. (10%)**

a) You've just finished collecting data for a 2-group between-subjects study with a ratio measure DV. You also collected the gender of each subject (but no other info). What are all the possible steps you might perform in data screening and analysis? (Order is important!)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

b) Perform a rank-order transform on the data to the right.

Collected data	Transformed data
3	
7	
4	
10	
9	
4	
2	
6	

7. **Study Designs, Hypothesis testing & SPSS. (8%)**

Descriptives

WordsPerMinute

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
MSWord	20	9.65	5.451	1.219	7.10	12.20	1	19
WizziWord	20	10.75	5.067	1.133	8.38	13.12	1	19
Emacs	8	21.75	11.348	4.012	12.26	31.24	8	42
Total	48	12.13	7.794	1.125	9.86	14.39	1	42

ANOVA

WordsPerMinute

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	901.450	2	450.725	10.381	.000
Within Groups	1953.800	45	43.418		
Total	2855.250	47			

What kind of test is this?

What kind of Study Design would you use this for?

Draw the research model:

Interpret the results

8. **Study Designs, Hypothesis testing & SPSS. (8%)**

Tests of Between-Subjects Effects

Dependent Variable: Satisfaction

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	124.948[a]	3	41.649	32.737	.000
Intercept	399.977	1	399.977	314.385	.000
Product	6.946	1	6.946	5.460	.030
Warranty	10.600	1	10.600	8.331	.009
Product * Warranty	123.450	1	123.450	97.032	.000
Error	25.445	20	1.272		
Total	450.020	24			
Corrected Total	150.393	23			

a. R Squared = .831 (Adjusted R Squared = .805)

What kind of test is this?

What kind of Study Design would you use this for?

Draw the research model:

Interpret the results

9. **Concepts.** (10%)

a) You want to assess how satisfaction with your web site changes over time for your users. How would you do a cross-sectional study to assess this?

_____

_____

Describe one problem with this design:
_____

_____

b) What is the purpose of the Methods section in a formal study report (e.g., APA style)?

_____

_____

c) You want to study the effects of Muzak (background music) on customer service center employee mood. You can't decide whether to use a between-subjects or within-subjects design. One argument for a within-subjects design: _____

_____

One argument for a between-subjects design: _____

_____

10. Study Proposal. Sketch a study proposal to compare the effects of Development Environment (Eclipse vs. Netbeans vs. Emacs) on Java programmer quality, tested on different groups of programmers. Quality to be measured by "source code elegance", rated by a panel of two experts. (25%)

10. Study Proposal, Continued

10. Study Proposal, Continued

10. Study Proposal, Continued