IS4800 Final Exam
Closed Book, Closed Notes, 2 hrs 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** (5%). On the following page is an excerpt from a study questionnaire. For each numbered question, indicate the descriptive statistics you would use. Assume interval and ratio measures are approximately normal unless noted.

		Mean	Median	Mode	StdDev	Inter-quartile range
Q1.						
Q2.						
Q3.	With outliers that can't be dropped.					
Q4.						
Q5.						
Q6.						

Please take a moment and answer a few questions about yourself:

Q1. Age:_____ Q2. Sex: M , F, Other_____ Q3. Weight:_____

Q4. Ethnic Background (check one):

American Indian or Alaskan Native ____
Asian or Pacific Islander ____
Black, Not of Hispanic Origin ____
White, Not of Hispanic Origin ____
Hispanic ____

Q5. *Composite measure of trust in government. Write an 'X' on each line:*

How **trustworthy** is government?

not at all • • • • • • • very trustworthy

How **competent** are politicians?

not at all • • • • • • • very competent

To what degree is Washington run by **lobbyists**?

not at all • • • • • • • entirely

Q6. What is the best medal you have ever won in the Olympics (check one):

Gold medal. ____
Silver medal. ____
Bronze medal. ____
None. ____

2. Power, etc. (5%)

Your between-subjects pilot study on the difference in playability between your new PolkaBand game and RockBand produces the following data on a composite self-report measure:

PolkaBand mean=6.3, SD=0.9

RockBand mean=5.3, SD=1.1

a) What is the effect size of the difference (d): _____

b) How many subjects will you need for a study that is 80% likely to demonstrate a significant difference between the products (given that a difference exists)? _____

TABLE 8–5 Approximate Number of Participants Needed in Each Group (Assuming Equal Sample Sizes) for 80% Power for the *t* Test for Independent Means, Testing Hypotheses at the .05 Significance Level

	Effect Size		
	Small (.20)	Medium (.50)	Large (.80)
One-tailed	310	50	20
Two-tailed	393	64	26

Notes:

- For t-test for dependent means, d=M/SD
- For t-test for independent means, d=(M1-M2)/SD

3. Power & Concepts (10%)

You plan a between-subjects study to see if your new robotic nose-picker works better than a finger, but your power analysis indicates you will need 744 subjects to show a significant difference (for α=.05, β=.8, 2-tail). You boss says to relax your standards ("they're just boogers" she says). What can you do to decrease the number of subjects you need (check all that apply)?

☐ Increase β. If yes, what are the disadvantages of doing this?

_____

☐ Decrease β. If yes, what are the disadvantages of doing this?

_____

☐ Increase α. If yes, what are the disadvantages of doing this?

_____

☐ Decrease α. If yes, what are the disadvantages of doing this?

_____

☐ Use a different experimental design and stats.
If yes, what change would you make?

_____

If yes, what are the disadvantages of doing this?

_____

☐ Use a 1-tail test.
If yes, what are the disadvantages of doing this?

_____

☐ Use a measure with a larger error variance (for same means).
If yes, what are the disadvantages of doing this?

_____

☐ Use a measure with a smaller error variance (for same means).
If yes, what are the disadvantages of doing this?

_____

4. **Data Screening & Analysis.** (5%)
You want to evaluate your now PowerPunt presentation software, comparing it to using a scantily clad assistant with a paper flip chart (gender matched to your presenter), evaluated by audience attentiveness measured in yawns per minute and satisfaction via questionnaire (between subjects). You are concerned about gender effects, so you record the gender of each subject.

a) What are the baseline (aka "potentially confounding variables" aka "covariate") analyses you would run?

b) If your outcome measures show significant skew what should you do?

c) What are the subgroup analyses you could do?

5. Data Screening & Analysis (5%)
Describe when you would use the following procedures, check all that apply.

a) Rank-order transform
Histogram: ☐ Unimodal&Symmetric ☐ Bimodal
☐ Unimodal & Positive skew
Measure type:
☐ Nominal ☐ Ordinal ☐ Interval ☐ Ratio

b) Log transform
Histogram: ☐ Unimodal&Symmetric ☐ Bimodal
☐ Unimodal & Positive skew
Measure type:
☐ Nominal ☐ Ordinal ☐ Interval ☐ Ratio

6. Concepts. (5%) You present a study proposal to your manager to evaluate playability of your new episodic online fantasy game compared to your competitor's game, evaluated at home for six months (between subjects). Your boss is concerned that subjects with better home computers will have a better experience. What are two ways of dealing with this extraneous variable? Describe in detail so your manager gets it.
a) Approach 1. _____
_____
_____
_____
b) Approach 2. _____
_____
_____
_____

7. Study Designs. (10%) You want to see if number and resolution of monitors has any impact on programmer quality, so you recruit 60 programmers and randomly assign them to receive either 1, 2 or 3 monitors, each of which is standard or high definition (resulting in six combinations: 1 monitor high, 1 monitor low, 2 monitors high, 2 monitors low, 3 monitors high, 3 monitors low). Quality is measured by a two judge panel, each judge assigning a value of 0-100% on all work produced by each programmer during a 4 hour shift.

7a. What kind of study design is this (check all that apply)?
☐ Descriptive ☐ Demonstration ☐ Correlational ☐ Experiment
☐ Between-subjects ☐ Within-subjects
☐ Univariate ☐ Multi-variate
☐ One-factor ☐ Two-factor ☐ Three-factor

7b. What statistics would you use?

7c. Draw the research model.

8. Study Designs (10%). You overhear some of your customer support staff saying they want to punch customers who complain too much, so you suggest to your boss that customer support staff be given 5 minute breaks every hour in a room with a punching bag to vent their frustration. To evaluate if this wasted break time has any effect, you take a random sample of 12 staff and have them do the new venting protocol for a week, while tracking another 12 staff as a control group. Customer satisfaction is continually assessed during the week for all staff by a survey administered at the end of every call.

8a. What kind of study design is this (check all that apply)?
☐ Descriptive ☐ Demonstration ☐ Correlational ☐ Experiment
☐ Between-subjects ☐ Within-subjects
☐ Univariate ☐ Multi-variate
☐ One-factor ☐ Two-factor ☐ Three-factor

8b. What statistics would you use?

7c. Draw the research model.

9. **Study Designs, Hypothesis testing & SPSS. (10%)**

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EarCleanerA_Satisfaction	3.240	5	1.6349	.7312
	EarCleanerB_Satisfaction	5.040	5	.7127	.3187
Pair 2	EarCleanerA_ Performance	2.820	5	1.0803	.4831
	EarCleanerB_ Performance	2.800	5	.8746	.3912

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	EarCleanerA_Satisfaction - EarCleanerB_Satisfaction	-1.8000	1.4300	.6395	-3.5756	-.0244	-2.815	4	.048
Pair 2	EarCleanerA_ Performance - EarCleanerB_ Performance	.0200	.2168	.0970	-.2492	.2892	.206	4	.847

a) What kind of test is this?

---

b) What kind of Study Design would you use this for (check all that apply)?

☐ Descriptive ☐ Demonstration ☐ Correlational ☐ Experiment
☐ Between-subjects ☐ Within-subjects
☐ Univariate ☐ Multi-variate
☐ One-factor ☐ Two-factor ☐ Three-factor

c) Draw the research model:

d) Interpret the results

---

10. **Study Designs, Hypothesis testing & SPSS. (10%)**

Tests of Between-Subjects Effects

Dependent Variable:HoursAwake

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13190.407[a]	5	2638.081	29.663	.000
Intercept	46208.000	1	46208.000	519.564	.000
EnergyDrink	12526.720	2	6263.360	70.425	.000
MusicVolume	660.056	1	660.056	7.422	.018
EnergyDrink * MusicVolume	3.631	2	1.816	.020	.980
Error	1067.233	12	88.936		
Total	60465.640	18			
Corrected Total	14257.640	17			

a. R Squared = .925 (Adjusted R Squared = .894)

a) What kind of test is this?

---

b) What kind of Study Design would you use this for (check all that apply)?

☐ Descriptive ☐ Demonstration ☐ Correlational ☐ Experiment

☐ Between-subjects ☐ Within-subjects

☐ Univariate ☐ Multi-variate

☐ One-factor ☐ Two-factor ☐ Three-factor

c) Draw the research model:

d) Interpret the results

---

11. Study Proposal (25%). Sketch a study proposal to prove which search engine is best (among Google, Yahoo, Bing and Ask) for individuals who have never used a computer before. Your outcome measures include time to perform a standardized task (after several training tasks) and satisfaction.

11. Study Proposal, Continued

11. Study Proposal, Continued