Preliminary Exam Preparation

The prelim will take place at March 18th, 4:45 PM — 6:00 PM (during the class' schedule). You are welcome to use any written material you wish to bring. However, computers and any type of digital devices are not permitted. Calculators are permitted.

The prelim will include three questions, one about experimental design, one about analysis, and the third about other issues that we've covered in the lectures. Please note that these example given here are just example for the type of questions we might ask. We can ask about other statistical tests, for example. Also, we may change the length of the exam (the number of sub-questions, for example).

Question 1: Experimentation design

The following excerpt is taken from the paper: Yan, J., Blackwell, A., Anderson, R., & Grant, A. (2004). Password memorability and security: Empirical results. *IEEE Security & privacy*, *2*(5), 25-31.

> Users rarely choose passwords that are both hard to guess and easy to remember. To determine how to help users choose good passwords, the authors performed a study of the effects of giving users different kinds of advice… password authentication therefore involves a tradeoff. Some passwords are easy to remember (for example, single words in a user's native language), but also easy to guess through dictionary searches. Other passwords are secure against guessing but difficult to remember. In this case, human limitations can compromise the password's security because the user might keep an insecure written record of it or resort to insecure backup authentication procedures after forgetting it. … We show that in this context, users can exploit mnemonic strategies for password memorization.
>
> We tested several advice types: a) traditional advice—that is, "Your password should be at least seven characters long and contain at least one nonletter. b) The random password group - a sheet of paper with the letters A–Z and the numbers 1–9 printed repeatedly on it. We told them to select a password by closing their eyes and randomly picking eight characters. We advised them to keep a written record with them until they'd memorized the password. c) pass phrase group (97 members) to choose a password based on a mnemonic phrase

Suggest an experimental design for a study that aims to fulfill the objectives defined in the excerpt. Specifically, please answer the following questions:

1. Would you suggest a between-subject or a within subject design or something else? Explain your choice.

2. Define the conditions for the experiment and the way you would assign participants to conditions.
3. Suggest the independent and dependent variables.
4. Which analysis method would you recommend for this experiment. Explain your choice.

Question 2: Experimentation analysis

A research study was conducted to examine the differences between Cornell students and NYU students on perceived life satisfaction. Ten Cornell students and ten NYU students (between 20 and 30) were give a life satisfaction test. Scores on the measure range from 0 to 60 with high scores indicative of high life satisfaction; low scores indicative of low life satisfaction. The data are presented below.

Cornell	NYU
45	34
38	22
52	15
48	27
25	37
39	41
51	24
46	19
55	26
46	36

1. What is the t-value?
2. What would be the null hypothesis in this study?
3. What would be the alternate hypothesis?
4. Is there a significant difference between the two groups? You can choose a critical value of your choice. Explain your answer. You can use the table below.
5. Interpret your answer.
6. What is the effect size?

Degrees of freedom	Significance level					
	20% (0.20)	10% (0.10)	5% (0.05)	2% (0.02)	1% (0.01)	0.1% (0.001)
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.043	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.158	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Question 3: All the rest

The third question will be about the rest of the material. We do not provide further details about this question.