Handout 4

A General Final Exam Review

Multiple Choices

1. In hypothesis testing, you assume that:
   (a) The alternative hypothesis is true in the sample.
   (b) The alternative hypothesis is true in the population.
   (c) The null hypothesis is true in the population.
   (d) The null hypothesis is true in the sample.

   The following question is for 2-3: Suppose you think that a greater proportion of Anteaters own a cat than non-Anteaters do. You take a sample of 525 Anteaters and found 441 own a cat. You take a sample of 120 non-Anteaters and found that 90 own a cat.

2. What is the standard error of the sampling distribution for the proportion difference?
   (a) 0.034
   (b) 0.043
   (c) 0.052
   (d) 0.112

3. What is the standard score of the sample proportion difference? And what type is this score?
   (a) 2.33, Z-score
   (b) 2.33, t-score
   (c) 2.11, Z-score
   (d) 2.11, t-score

4. We can obtain the P-Value from a Z-table with Z score and the t value from t table with critical t. What do P-value and t value describe respectively?
   (a) (1 - P-value) is the probability of obtaining a number less than Z score. t value is the probability of getting a number larger than the critical t.
   (b) P-value is the probability of obtaining a number larger than Z score. t value is the probability of getting a number larger than the critical t.
   (c) P-value is the probability of obtaining a number less than Z score. (1 - t value) is the probability of getting a number less than the critical t.
   (d) (1 - P-value) is the probability of obtaining a number less than Z score. (1 - t value) is the probability of getting a number larger than the critical t.

   The following question is for 5-6: Suppose you want to quantify the benefit of doing meditation by the observed anxiety level. You will conduct two kinds of research designs:

5. You select a group of people and measure their anxieties (data A). Then you send them to a 3 months meditation course and record their anxiety level (data B) after taking the class. What is the null hypothesis for this test?
   (a) $\mu_{\text{A}} - \mu_{\text{B}} = 0$
   (b) $\mu_{\text{B-A}} \neq 0$
   (c) $\mu_{\text{A}} - \mu_{\text{B}} \geq 0$
   (d) $\mu_{\text{B-A}} = 0$

6. If you select two groups of people and ask a group to do meditations before bed for 3 days then record their anxiety level (data A) and ask the other group to go to bed directly (data B). What is the null hypothesis for this test?
   (a) $\mu_{\text{A}} - \mu_{\text{B}} = 0$
   (b) $\mu_{\text{B-A}} \neq 0$
   (c) $\mu_{\text{A}} - \mu_{\text{B}} \geq 0$
   (d) $\mu_{\text{B-A}} = 0$
7. When we doesn't have enough evidence to reject the the Null, what type of error can we make?
   (a) α error
   (b) β error
   (c) Type-I error
   (d) No error will be made
8. When the probability of making a Type-I error is 0.1, what is the confidence level and the significance level of this test?
   (a) confidence level: 0.1, significance level: 0.9
   (b) confidence level: 0.1, significance level: 0.1
   (c) confidence level: 0.9, significance level: 0.9
   (d) confidence level: 0.9, significance level: 0.1

The following question is for 9-11: Suppose that the usual "chill" scale has a mean of 500 and a standard deviation known to be 27 for the population of adults in the US. The distribution is known to be approximately normal. And you feel that people who watch Netflix are generally "chiller" than most. You take a random sample of 117 Netflix users. The sample has a mean of 505.25.

9. What is the mean and standard error of the sampling distribution with all samples of size 117?
   (a) 500.00, 2.50
   (b) 505.25, 2.50
   (c) 500.00, 2.22
   (d) 505.25, 2.22
10. What is the standardized sample mean and what is the terminology for this value?
   (a) 2.46, Z-score
   (b) 2.10, Z-score
   (c) 2.22, t-score
   (d) 2.50, t-score
11. If the probability of obtaining a number less than the standardized sample mean is 0.9821, what is the confidence level of this test?
   (a) 0.0102
   (b) 0.0179
   (c) 0.0069
   (d) 0.0150

The following question is for 12-13: Suppose you are trying to show the effectiveness of a school program in reducing test anxiety. You pick 4 people at random and measure their anxiety (X_a). You then have all 4 people attend the program for 3 months. You measure their anxiety again (X_b).

ID	X_a	X_b
A	32	30
B	40	34
C	36	30
D	43	37

12. What is the estimated standard error of the population change?
    (a) 4
    (b) 3
    (c) 2
    (d) 1
13. What is the estimated standard error of the sampling distribution for the change?
    (a) 4
    (b) 3
    (c) 2
    (d) 1

The following question is for 14-16: Suppose it is believed that the population of college students spend, on average, 38.4 minutes getting ready for school. Assume the distribution is known to be approximately normal. You believe that the mean of this population is less than 38.4 minutes. You take a sample of 22 college students presenting with the table below and test at the .05 significance level.

X_i	f
42	4
27	3
51	2
23	1
36	7
31	5

14. Based on the sample data, if we randomly picked a sample of 22 students from the population, how far would we expect that sample mean to be from the population mean?
    (a) 3.76
    (b) 6.66
    (c) 1.56
    (d) 7.02
15. Following the previous question, if we randomly picked one student from the population, how far would be expect them to be from the population mean?
    (a) 4.13
    (b) 3.65
    (c) 0.82
    (d) 7.32
16. What is the obtained t?
    (a) -2.019
    (b) -1.483
    (c) -1.858
    (d) -1.956

The following question is for 17-19: Suppose you think that people who work from home have different productivity levels than people who work in offices. Samples of 49 people who work from home and 81 people who work in offices are collected and showed in the table below. Their productivity levels are recorded. Assume that both groups have approximately normal distributions and that both groups have equal variances in the population.

Home:	$n_{\text{H}} = 49$	$\overline{X}_{\text{H}} = 52.1$	$\text{SS}_{\text{H}} = 566.44$
Office:	$n_{\text{O}} = 81$	$\overline{X}_{\text{O}} = 50.3$	$\text{SS}_{\text{O}} = 1944.81$

17. If you picked one person from Group H, on average, how far would they be away from their sample mean?
    (a) 4.2
    (b) 3.4
    (c) 3.1
    (d) 3.2

18. What is the estimated standard error of the sampling distribution of the sample difference?
    (a) 0.735
    (b) 0.730
    (c) 0.743
    (d) 0.752

19. If you realize that you make a typo that the correct numbers are $n_{\text{H}} = 15$ and $n_{\text{O}} = 23$ with all other information being correct, what is the estimated standard error of the sampling distribution of the sample difference?
    (a) 1.45
    (b) 1.46
    (c) 1.47
    (d) 1.48

The following question is for 20-21: There are currently four major coffee shops: Starbucks (S), Coffee Bean (C), Peet's Coffee (P), and Dunkin' Donuts (D). Suppose the generally accepted market share proportion of these four coffee shops is described in Table A. You believe the market share is different. You ask 50 people what their favorite coffee shop is and do a test at the 0.01 level. Their response is described in Table B.

Table A (proportions)

X	p
S	0.1
C	0.1
P	0.3
D	0.5

Table B (sample)

X	f
S	10
C	10
P	15
D	15

• some useful values (at $\alpha = 0.01$): $\chi^2(3) = 11.345$, $\chi^2(4) = 13.277$, $\chi^2(5) = 15.086$.

20. What is the obtained chi-square value?
    (a) 10
    (b) 14
    (c) 12
    (d) 16

21. Can you reject the null hypothesis?
    (a) No, because p seems to be greater than 0.01
    (b) No, because p seems to be less than 0.01
    (c) Yes, because p seems to be greater than 0.01
    (d) Yes, because p seems to be less than 0.01

22. Below is a two way ANOVA table showing the row, column, and grand mean. Assume no interaction and an equal number of cases in each cell. What is the mean in the upper left cell?

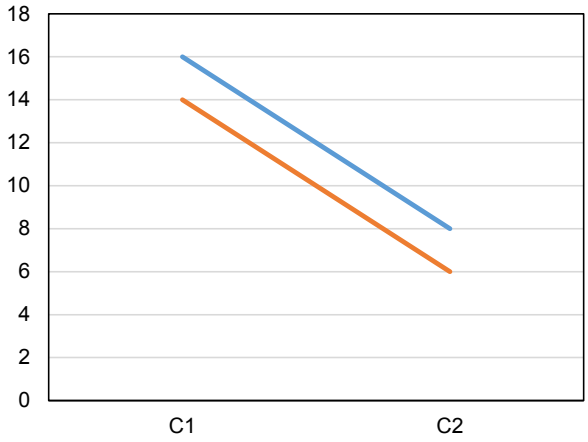
$\overline{X}_{r1} = 17$

$\overline{X}_{c1} = 11$ $\overline{X} = 13$

What is the *mean* in the upper left cell?

(a) 19
(b) 7
(c) 15
(d) 12

23. Below is a two way ANOVA graph. Assume an equal number of cases in each cell.



Which has the strongest effect?

(a) Row
(b) Column
(c) Interaction
(d) Column and Interaction

24. Below are 4 possible data sets described in two way ANOVA tables showing cell means:

Table 1

2	6
4	8

Table 2

0	0
0	4

Table 3

2	0
0	2

Table 4

0	0
2	2

Which table(s) above show(s) interaction?

(a) Table 1 and Table 4 only
(b) Table 1 only
(c) Table 2 and 3 only
(d) Table 1, 2 and 4 only
(e) All 4 tables.