

Bunker Hill Community College

Final Statistics Exam 2019-05-02

Exam ID 018

Name: _____

This take-home exam is due **Wednesday, May 8**, at the beginning of class.

You may use any notes, textbook, or online tools; however, you may not request help from any other human.

You will show your work on the pages with questions. When you are sure of your answers, you will **put those answers in the boxes** on the first few pages.

Unless you have an objection to doing so, please **copy the honor-code text below and sign**.

I understand that outside help is NOT allowed on this exam. On my honor, the work herein is my own.

Signature: _____

1. (a)
- (b)
- (c)
- (d)
- (e)
- (f)
2.
3.
4. (a)
- (b)
5.
6. (a)
- (b)
- (c)
- (d)
- (e)
- (f)
- (g)
7. (a)
- (b)

8. (a)
- (b)
- (c)
- (d)
- (e)
- (f)
- (g)

1. In a deck of strange cards, there are 841 cards. Each card has an image and a color. The amounts are shown in the table below.

	indigo	pink	teal	white	yellow
bike	59	90	18	12	60
cat	38	74	25	93	22
flower	84	96	79	39	52

- (a) What is the probability a random card is a bike given it is indigo?
- (b) What is the probability a random card is both a flower and white?
- (c) What is the probability a random card is indigo given it is a bike?
- (d) What is the probability a random card is yellow?
- (e) What is the probability a random card is a flower?
- (f) What is the probability a random card is either a flower or yellow (or both)?

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a pig is 11.1%. If a pig is drawn, there is a 36.5% chance that it is blue. If a card that is not a pig is drawn, there is a 83.5% chance that it is blue.

Now, someone draws a random card and reveals it is not blue. What is the chance the card is a pig?

3. In a very large pile of toothpicks, the mean length is 64.85 millimeters and the standard deviation is 1.42 millimeters. If you randomly sample 125 toothpicks, what is the chance the sample mean is between 64.77 and 65.17 millimeters?

4. In a game, there is a 53% chance to win a round. You will play 164 rounds.
- (a) What is the probability of winning exactly 91 rounds?
 - (b) What is the probability of winning at least 81 but at most 96 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Dendroica palmarum*. You randomly sample 29 adults of *Dendroica palmarum*, resulting in a sample mean of 10.54 grams and a sample standard deviation of 1.2 grams. Determine a 95% confidence interval of the true population mean.

6. A treatment group of size 31 has a mean of 1020 and standard deviation of 69.1. A control group of size 20 has a mean of 1060 and standard deviation of 54.2. If you decided to use a significance level of 0.02, is there sufficient evidence to conclude the treatment causes an effect?

By using the Welch-Satterthwaite equation, I've calculated the degrees of freedom should be 47.

- (a) State the null hypothesis.
- (b) State the alternative hypothesis.
- (c) Evaluate the critical value. (The critical value is either z^* or t^* . Determine its value.)
- (d) Determine the standard error of the relevant sampling distribution.
- (e) Evaluate the absolute value of the test statistic. (The test statistic is either z_{obs} or t_{obs} . Determine its absolute value.)
- (f) If possible, evaluate the p -value. Otherwise, describe an interval containing the p -value.
- (g) Do we reject or retain the null?

7. From a very large population, a random sample of 5300 individuals was taken. In that sample, 56.2% were special. Determine a 80% confidence interval of the population proportion.
- (a) Find the lower bound of the confidence interval.
 - (b) Find the upper bound of the confidence interval.

8. An experiment is run with a treatment group of size 285 and a control group of size 314. The results are summarized in the table below.

	treatment	control
sorry	121	161
not sorry	164	153

Using a significance level of 0.05, determine whether the treatment causes an effect on the proportion of cases that are sorry.

- (a) State the null hypothesis.
- (b) State the alternative hypothesis.
- (c) Evaluate the critical value. (The critical value is either z^* or t^* . Determine its value.)
- (d) Determine the standard error of the relevant sampling distribution.
- (e) Evaluate the absolute value of the test statistic. (The test statistic is either z_{obs} or t_{obs} . Determine its absolute value.)
- (f) If possible, evaluate the p -value. Otherwise, describe an interval containing the p -value.
- (g) Do we reject or retain the null?