

Bunker Hill Community College

Final Statistics Exam 2019-05-02

Exam ID 002

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 827 cards. Each card has an image and a color. The amounts are shown in the table below.

	gray	pink	red	white
bike	24	88	93	69
pig	87	27	42	16
tree	21	38	47	58
wheel	51	28	52	86

- (a) What is the probability a random card is pink given it is a bike?
- (b) What is the probability a random card is a tree given it is pink?
- (c) What is the probability a random card is red?
- (d) What is the probability a random card is both a bike and red?
- (e) What is the probability a random card is either a bike or red (or both)?
- (f) What is the probability a random card is a pig?

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a tree is 33.7%. If a tree is drawn, there is a 14.7% chance that it is yellow. If a card that is not a tree is drawn, there is a 54.8% chance that it is yellow.

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

3. In a very large pile of toothpicks, the mean length is 61.98 millimeters and the standard deviation is 3.52 millimeters. If you randomly sample 169 toothpicks, what is the chance the sample mean is between 61.55 and 62.3 millimeters?

4. In a game, there is a 39% chance to win a round. You will play 80 rounds.
- (a) What is the probability of winning exactly 30 rounds?
 - (b) What is the probability of winning at least 34 but at most 39 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Hylocichla mustelina*. You randomly sample 29 adults of *Hylocichla mustelina*, resulting in a sample mean of 55.61 grams and a sample standard deviation of 5.63 grams. Determine a 80% confidence interval of the true population mean.

6. A treatment group of size 32 has a mean of 1060 and standard deviation of 77.5. A control group of size 40 has a mean of 1020 and standard deviation of 96.6. If you decided to use a significance level of 0.05, 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 69.

- (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 52000 individuals was taken. In that sample, 1.9% were angry. 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 16 and a control group of size 21. The results are summarized in the table below.

	treatment	control
abysmal	5	14
not abysmal	11	7

Using a significance level of 0.04, determine whether the treatment causes an effect on the proportion of cases that are abysmal.

- (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?