

Bunker Hill Community College

Final Statistics Exam 2019-05-02

Exam ID 011

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

	gray	green	pink	red	white
bike	42	94	24	89	41
cat	97	64	80	20	68
shovel	43	77	90	69	19

- (a) What is the probability a random card is gray given it is a bike?
- (b) What is the probability a random card is a shovel given it is red?
- (c) What is the probability a random card is a bike?
- (d) What is the probability a random card is both a cat and red?
- (e) What is the probability a random card is white?
- (f) What is the probability a random card is either a bike or red (or both)?

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a shovel is 25%. If a shovel is drawn, there is a 50.1% chance that it is yellow. If a card that is not a shovel is drawn, there is a 69.7% chance that it is yellow.

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

3. In a very large pile of toothpicks, the mean length is 61.68 millimeters and the standard deviation is 3.52 millimeters. If you randomly sample 200 toothpicks, what is the chance the sample mean is between 61.3 and 61.93 millimeters?

4. In a game, there is a 69% chance to win a round. You will play 195 rounds.
- (a) What is the probability of winning exactly 140 rounds?
 - (b) What is the probability of winning at least 127 but at most 149 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Passerina cyanea*. You randomly sample 19 adults of *Passerina cyanea*, resulting in a sample mean of 15.71 grams and a sample standard deviation of 2.39 grams. Determine a 95% confidence interval of the true population mean.

6. A treatment group of size 37 has a mean of 0.948 and standard deviation of 0.18. A control group of size 34 has a mean of 1.07 and standard deviation of 0.251. 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 59.

- (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 8000 individuals was taken. In that sample, 29.1% were angry. Determine a 99% 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 299 and a control group of size 282. The results are summarized in the table below.

	treatment	control
happy	161	176
not happy	138	106

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

- (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?