

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

	green	indigo	pink	red	yellow
dog	16	26	86	65	14
pig	34	18	36	68	90
shovel	31	19	45	73	41
tree	84	40	13	20	76

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

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a wheel is 25.9%. If a wheel is drawn, there is a 80.4% chance that it is green. If a card that is not a wheel is drawn, there is a 12.7% chance that it is green.

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

3. In a very large pile of toothpicks, the mean length is 68.4 millimeters and the standard deviation is 1.99 millimeters. If you randomly sample 225 toothpicks, what is the chance the sample mean is between 68.15 and 68.51 millimeters?

4. In a game, there is a 58% chance to win a round. You will play 48 rounds.
- (a) What is the probability of winning exactly 25 rounds?
 - (b) What is the probability of winning at least 23 but at most 34 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Vireo griseus*. You randomly sample 33 adults of *Vireo griseus*, resulting in a sample mean of 10.04 grams and a sample standard deviation of 0.653 grams. Determine a 80% confidence interval of the true population mean.

6. A treatment group of size 33 has a mean of 109 and standard deviation of 14. A control group of size 29 has a mean of 101 and standard deviation of 11.1. If you decided to use a significance level of 0.01, 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 5400 individuals was taken. In that sample, 87.8% were tasty. 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 165 and a control group of size 173. The results are summarized in the table below.

	treatment	control
folksy	110	94
not folksy	55	79

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

- (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?