

Bunker Hill Community College

Final Statistics Exam 2019-05-02

Exam ID 012

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

	black	blue	gray	teal
cat	45	73	80	56
dog	54	61	60	18
flower	15	75	63	34
gem	81	67	53	72

- (a) What is the probability a random card is a flower?
- (b) What is the probability a random card is both a dog and gray?
- (c) What is the probability a random card is a cat given it is black?
- (d) What is the probability a random card is either a gem or blue (or both)?
- (e) What is the probability a random card is blue?
- (f) What is the probability a random card is black given it is a cat?

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a ring is 19.1%. If a ring is drawn, there is a 74.6% chance that it is green. If a card that is not a ring is drawn, there is a 55.7% 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 ring?

3. In a very large pile of toothpicks, the mean length is 63.2 millimeters and the standard deviation is 3.83 millimeters. If you randomly sample 225 toothpicks, what is the chance the sample mean is between 63 and 63.33 millimeters?

4. In a game, there is a 68% chance to win a round. You will play 178 rounds.
- (a) What is the probability of winning exactly 119 rounds?
 - (b) What is the probability of winning at least 109 but at most 121 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Dendroica palmarum*. You randomly sample 26 adults of *Dendroica palmarum*, resulting in a sample mean of 10.28 grams and a sample standard deviation of 1 grams. Determine a 80% confidence interval of the true population mean.

6. A treatment group of size 30 has a mean of 1.03 and standard deviation of 0.052. A control group of size 37 has a mean of 1.01 and standard deviation of 0.0373. 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 51.

- (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 19000 individuals was taken. In that sample, 66.8% were asleep. Determine a 99.5% 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 135 and a control group of size 102. The results are summarized in the table below.

	treatment	control
glossy	16	6
not glossy	119	96

Using a significance level of 0.1, determine whether the treatment causes an effect on the proportion of cases that are glossy.

- (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?