

Bunker Hill Community College

Final Statistics Exam 2019-05-02

Exam ID 019

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

	blue	indigo	pink	red
flower	68	23	63	78
horn	11	50	59	92
pig	42	14	61	37

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

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a tree is 45.1%. If a tree is drawn, there is a 83.3% chance that it is violet. If a card that is not a tree is drawn, there is a 21.1% chance that it is violet.

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

3. In a very large pile of toothpicks, the mean length is 60.15 millimeters and the standard deviation is 2.17 millimeters. If you randomly sample 125 toothpicks, what is the chance the sample mean is between 60.01 and 60.35 millimeters?

4. In a game, there is a 20% chance to win a round. You will play 239 rounds.
- (a) What is the probability of winning exactly 44 rounds?
 - (b) What is the probability of winning at least 41 but at most 57 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Denrdoica magnolia*. You randomly sample 36 adults of *Denrdoica magnolia*, resulting in a sample mean of 9.39 grams and a sample standard deviation of 1.53 grams. Determine a 98% confidence interval of the true population mean.

6. A treatment group of size 33 has a mean of 952 and standard deviation of 198. A control group of size 30 has a mean of 1050 and standard deviation of 217. If you decided to use a significance level of 0.1, 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 58.

- (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 53000 individuals was taken. In that sample, 91.1% were cold. 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 102 and a control group of size 68. The results are summarized in the table below.

	treatment	control
green	27	9
not green	75	59

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

- (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?