Bunker Hill Community College

Final Statistics Exam 2019-05-02 **Exam ID 017**

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

	indigo	red	violet	white
bike	21	54	17	38
dog	55	34	57	56
pig	72	31	33	87
wheel	65	29	47	85

   (a) What is the probability a random card is a dog given it is white?

   (b) What is the probability a random card is both a pig and violet?

   (c) What is the probability a random card is violet given it is a wheel?

   (d) What is the probability a random card is white?

   (e) What is the probability a random card is either a dog or white (or both)?

   (f) What is the probability a random card is a wheel?

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a llama is 12%. If a llama is drawn, there is a 63.6% chance that it is white. If a card that is not a llama is drawn, there is a 33.5% chance that it is white.

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

3. In a very large pile of toothpicks, the mean length is 62.84 millimeters and the standard deviation is 3.3 millimeters. If you randomly sample 144 toothpicks, what is the chance the sample mean is between 62.52 and 63.24 millimeters?

4. In a game, there is a 22% chance to win a round. You will play 90 rounds.
   (a) What is the probability of winning exactly 18 rounds?
   (b) What is the probability of winning at least 14 but at most 27 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Vireo griseus*. You randomly sample 16 adults of *Vireo griseus*, resulting in a sample mean of 10.18 grams and a sample standard deviation of 0.729 grams. Determine a 99.5% confidence interval of the true population mean.

6. A treatment group of size 16 has a mean of 99.8 and standard deviation of 7.01. A control group of size 21 has a mean of 105 and standard deviation of 9.21. If you decided to use a signficance 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 34.

   (a) State the null hypothesis.

   (b) State the alternative hypothesis.

   (c) Evaluate the critical value. (The critical value is either $z^\star$ or $t^\star$. 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 360 individuals was taken. In that sample, 49.2% were sweet. Determine a 90% confidence interval of the population proportion.

   (a) Find the lower bound of the confidence interval.

   (b) Find the upper bound of the condifence interval.

8. An experiment is run with a treatment group of size 115 and a control group of size 92. The results are summarized in the table below.

	treatment	control
pink	91	57
not pink	24	35

Using a significance level of 0.01, determine whether the treatment causes an effect on the proportion of cases that are pink.

(a) State the null hypothesis.

(b) State the alternative hypothesis.

(c) Evaluate the critical value. (The critical value is either $z^\star$ or $t^\star$. 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?