Bunker Hill Community College

Final Statistics Exam 2019-05-02   **Exam ID 006**

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

	gray	orange	violet	yellow
bike	79	86	37	52
cat	50	53	69	54
gem	56	27	46	90
shovel	61	59	87	22

   (a) What is the probability a random card is a shovel?

   (b) What is the probability a random card is gray given it is a bike?

   (c) What is the probability a random card is both a gem and orange?

   (d) What is the probability a random card is a bike given it is yellow?

   (e) What is the probability a random card is either a gem or violet (or both)?

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

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a shovel is 49.3%. If a shovel is drawn, there is a 74.3% chance that it is blue. If a card that is not a shovel is drawn, there is a 12.6% chance that it is blue.

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

3. In a very large pile of toothpicks, the mean length is 69.19 millimeters and the standard deviation is 1.01 millimeters. If you randomly sample 120 toothpicks, what is the chance the sample mean is between 69.04 and 69.24 millimeters?

4. In a game, there is a 34% chance to win a round. You will play 191 rounds.

   (a) What is the probability of winning exactly 59 rounds?

   (b) What is the probability of winning at least 70 but at most 76 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Vermivora pereg-rina*. You randomly sample 35 adults of *Vermivora peregrina*, resulting in a sample mean of 12.82 grams and a sample standard deviation of 1.26 grams. Determine a 90% confidence interval of the true population mean.

6. A treatment group of size 17 has a mean of 10.5 and standard deviation of 1.04. A control group of size 13 has a mean of 11.2 and standard deviation of 1.51. 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 20.

   (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 3800 individuals was taken. In that sample, 72.9% were super. Determine a 95% 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 167 and a control group of size 135. The results are summarized in the table below.

	treatment	control
omnivorous	16	20
not omnivorous	151	115

Using a significance level of 0.2, determine whether the treatment causes an effect on the proportion of cases that are omnivorous.

   (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?