Bunker Hill Community College

Final Statistics Exam 2019-05-02   **Exam ID 015**

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 1128 cards. Each card has an image and a color. The amounts are shown in the table below.

	blue	orange	pink	teal	white
bike	32	28	18	68	19
cat	85	95	52	74	55
flower	91	79	50	71	90
wheel	42	44	94	16	25

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

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

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

(d) What is the probability a random card is both a wheel and blue?

(e) What is the probability a random card is a bike given it is blue?

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

2. In a deck of strange cards, each card has an image and a color. The chance of drawing a llama is 39.7%. If a llama is drawn, there is a 15.6% chance that it is yellow. If a card that is not a llama is drawn, there is a 79.9% chance that it is yellow.

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

3. In a very large pile of toothpicks, the mean length is 60.6 millimeters and the standard deviation is 1.35 millimeters. If you randomly sample 175 toothpicks, what is the chance the sample mean is between 60.5 and 60.79 millimeters?

4. In a game, there is a 70% chance to win a round. You will play 205 rounds.

   (a) What is the probability of winning exactly 140 rounds?

   (b) What is the probability of winning at least 144 but at most 150 rounds?

5. As an ornithologist, you wish to determine the average body mass of *Dendroica dominica*. You randomly sample 25 adults of *Dendroica dominica*, resulting in a sample mean of 10.35 grams and a sample standard deviation of 1.99 grams. Determine a 98% confidence interval of the true population mean.

6. A treatment group of size 20 has a mean of 94.4 and standard deviation of 25. A control group of size 19 has a mean of 110 and standard deviation of 30. 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 35.

    (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 8900 individuals was taken. In that sample, 10.5% were purple. Determine a 98% 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 99 and a control group of size 118. The results are summarized in the table below.

	treatment	control
green	61	55
not green	38	63

Using a significance level of 0.04, 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 $z^\star$ 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?