Carson-Newman University MATH 201 Test 2, Spring 2020

Directions:

- You may use your calculator, book, notes, or any resource linked to from the course webpage.

- Do not seek help from any other individual, whether in person or electronically.

- Compose an email with your answers as described in the class announcements page.

- To receive full credit, you must show all relevant work (and calculator commands) to justify your answer.

- Clearly identify your final answer, correct to at least 3 significant digits.

- Use notation as described in class.

Honor Pledge: I pledge that I will neither give nor receive unauthorized help on this test from any person, technology, or other resource, and that I will abide by the honor code of Carson-Newman University.

Signed: _____

1. The Easter bunny leaves your family a dozen chocolate covered eggs.

   - 5 are filled with peanut butter
   - 4 are filled with vanilla creme
   - 3 are filled with caramel

   But you can't tell which is which. Your mom lets you pick two eggs without replacement.

   (a) Find the probability that both are peanut butter.
   (b) Find the probability that at least one is peanut butter.
   (c) Find the probability that the two eggs have different fillings, i.e. not (PP or VV or CC).

2. Assume these given probabilities, and that the events are independent.

   - Alabama beats Tennessee $P(A) = .85$
   - Biden becomes president $P(B) = .32$

   (a) Find the probability of both A and B.
   (b) Find the probability of neither A nor B.
   (c) Find the probability of either A or B.

3. Suppose there is a remote chance that a tornado hits your house this month. Say the estimated probability is $p = 0.0000078$. You could write that probability as one out of _____.

4. The nutrition lab wants to estimate the number of calories in a muffin. If the standard deviation in caloric readings of individual muffins is $\sigma = 40$, then find the standard error if we average the caloric readings of 5 muffins.

5. Here is a scatterplot of COVID-19 contagion rate (y) versus the average daily temperature (x degrees celcius) for a sample of individuals tracked in various Chinese cities.

y=1.99 - 0.0224x
$R^2 = 0.17$
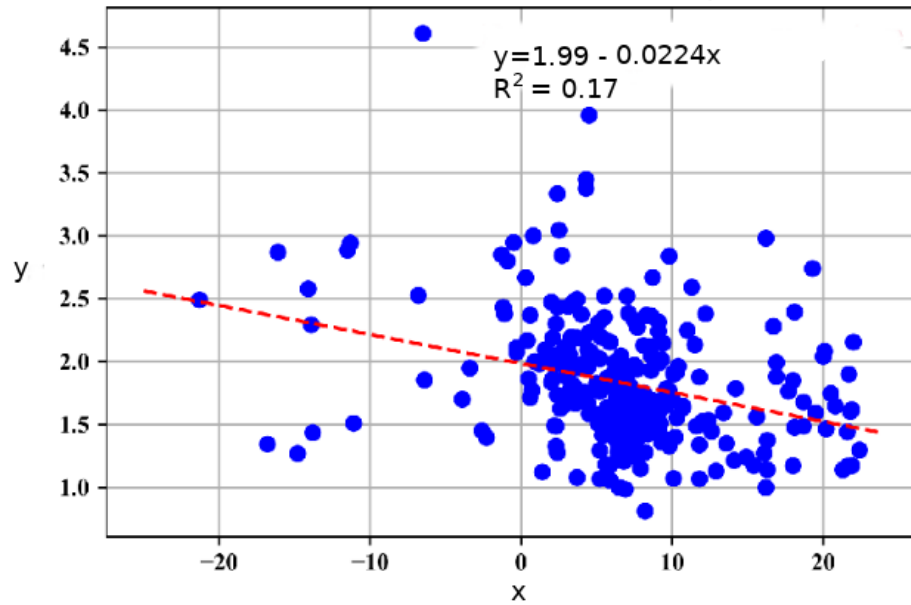
(a) Find the slope.

(b) Find the correlation.

(c) Use the linear model to find $\hat{y}$ in a warm climate with $x = 28$ degrees celcius.

(d) Would that prediction be considered (intepolation) or (extrapolation) ?

6. Suppose a COVID-19 test has a 8% false positive rate, meaning there is an 8% chance that somebody who does NOT have the virus will test postive anyway. If 50 such people get tested, model the number of false positives as $X \sim BI(50, 0.08)$; assume independence.

(a) Find the expected value of X.

(b) Find $P(X \geq 5)$.

7. Suppose John's time to finish a sprint is $X \sim N(500, 35)$ seconds.

(a) Find the 99th percentile time; write your answer as minutes : seconds.

(b) Find the z-score of 8 minutes.

(c) Find the probability he finishes in under 8 minutes.

8. This table shows the probability distribution of X, the week of the year in which Jefferson City, TN has its last frost.

x	PDF	CDF
12		.06
13		.22
14		.43
15		.71
16		.86
17		.97
18		1

(a) Complete the table

(b) Find the expected value of X. (do not round)

(c) Find $P(X > 15)$.

(d) Find $P(X > 15$ or $X = 12)$.

(e) Find $P(X > 15$ and $X = 12)$.

9. Let X be the week of the year when Jeff City gets their last frost, and let Y be the week of the year when Nashville gets their last frost. Do you think X and Y are independent ? Explain with a brief paragraph.