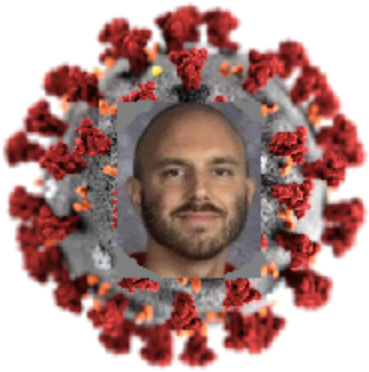
Makeup Questions



You must go down the list in the order they are given, you can't just hunt around for questions you want to do.

Question 50

A principal at a high school with a large population of students wanted to estimate the proportion of students who regularly pick up their trash. The principal selected a random sample of students at the school to survey. Each selected student went into the principal's office, one at a time, and was asked to respond yes or no to the following question

dO yOu ReGuLaRlY plcK uP yOuR tRaSh?

Based on the responses, a 95 percent confidence interval for the proportion of all students at the school who would respond yes to the question was calculated as (0.464, 0.736).

(a) How many students were in the sample selected by the principal?

(b) The statistic teacher at the school thinks there could be bias in the responses. Explain why there could be bias, and describe how bias might have affected the point estimate of the proportion of all students at the school who would respond yes.

(c) In an effort to obtain a less biased estimate of the proportion, the statistics teacher used a different method. A random sample of 400 students was selected, and each student was given the following instructions.

- In private, flip a fair coin
- If heads, just respond no, regardless of whether you actually regularly pick up your trash.
- If tails, please truthfully respond yes or no.

(i) What is the expected number of students from the sample of 400 who would be required to respond no because of the coin flip?

(ii) The results of the sample showed that 298 of the 400 selected students responded no. Based on the results of the sample, give a point estimate for the proportion of all students at the high school who would respond yes to the question.

Question 51

Savemart was curious if the proportion of checkouts where a customer purchased at least one organic item during their shopping trip increased from 2018 to 2019. In 2018, 19.9 percent of 60 randomly selected checkouts included at least one organic item. In 2019, 38.4 percent of 51 randomly selected checkouts included at least one organic item. Do the data provide convincing statistical evidence, at the level of $\alpha = 0.05$, that there has been an increase in the proportion of all checkouts that include at least one organic item?

Question 52

Nine teachers, 16 women and 4 men, wanted to attend AP training. The school only had enough money to send 3 teachers. The principal said he would select 3 random teachers who got to attend the conference. The 3 teachers randomly selected were men. The women teachers suspected that maybe the principal didn't select the 3 teachers randomly.

(a) Calculate the probability that randomly selecting 3 teachers from a group of 16 women and 4 men will result in selecting 3 men.
(b) Based on your answer to part (a), is it reasonable to doubt that the principal selected the 3 teachers randomly? Explain
(c) An alternative to calculating exact probabilities is to perform simulations to estimate probabilities. Fatima proposed the following simulation process

Each trial of the simulation consists of rolling three fair, twenty-sided dice, one die for each of the convention attendees. For each die, rolling a 1, 2, 3, or 4 represents selecting a man; rolling anything else represents selecting a woman. After 1,000 trials, the proportion of times

Question 53

A principal conducted a study to determine whether backpacks were too heavy. The principal classified weights over 30 pounds as being too heavy. The weights of a random sample of 20 backpacks at the principal's school were measured and recorded. The data are shown in the stemplot below.

0	5 7 8
1	0 5 7 7
2	1 2 4 8 9 9
3	0 6 6
4	1 2 8
5	0

Key: 2|4 = 24 pounds

(a) What proportion of backpacks in the sample had weights that the principal classified as too heavy?
(b) The mean weight of the 20 backpacks in the sample was 25.75 pounds and the standard deviation was 13.549 pounds. Construct and interpret a 95 percent confidence interval for the mean weight of backpacks at the principal's high school.

Question 54

Approximately 2.5 percent of adults believe the earth is flat. Of adults who believe the earth is flat, 68 percent wear tin foil hats at home. Of adults who don't believe the earth is flat, 1 percent wear tin foil hats at home.

(a) What is the probability that a randomly selected adult wears a tin foil hat at home?
(b) What is the probability that a randomly selected adult believes the earth is flat, given that they wear a tin foil hat at home?
(c) A random sample of 70 adults will be selected. What is the probability that the sample will have at least 2 people wear tin foil hats at home

Question 55

A car manufacturer has developed a new automatic transmission that lasts longer than a traditional automatic transmission. From the date of purchase of the car, the distribution of the life span of the new automatic transmission is approximately normal with mean 14 years and standard deviation 5 years. For $600, the company offers a ten-year warranty on the new automatic transmission. The warranty guarantees that the automatic transmission will be replaced at no cost to the customer if the automatic transmission no longer works within ten years from the date of purchase.423.8

(a) In how many months from the date of purchase is it expected that 20 percent of the automatic transmissions will no longer work? Justify your answer.

(b) Suppose one customer who purchases the warranty is selected at random. What is the probability that the customer selected will require a replacement within 10 years from the date of purchase because the automatic transmission no longer works?

(c) The company has a gain of $600 for each customer who purchases a warranty but does not require a replacement. The company has a loss (negative gain) of $2000 for each customer who purchases a warranty and does require a replacement. What is the expected value of the gain for the company for each warranty purchased?

Question 56

A full calculator holder kit consists of 10 randomly selected calculators and 1 randomly selected empty plastic container. The weights of such full kits are approximately normally distributed with a mean of 8 pounds and a standard deviation of 0.09 pounds.

(a) What is the probability that a randomly selected full kit will weigh more than 8.1 pounds?

(b) The weights of the empty plastic containers have a mean of 3 pounds and a standard deviation of 0.05 pounds. It is reasonable to assume independence between the weights of the empty plastic containers and the weights of the calculators. It is also reasonable to assume independence among the weights of the 10 calculators that are randomly selected for a full kit.

Let the random variable C be the weight of a single randomly selected calculator.

(i) What is the mean of C?

(ii) What is the standard deviation of C?