
Quiz 4 - DSC 10, Spring 2024

Full Name:

PID:

Quiz Time: ☐ 2PM ☐ 2:30PM ☐ 3PM ☐ 3:30PM ☐ 4PM

Instructions:

- This quiz consists of 6 questions. You have a total of 20 minutes to complete it.
 - Please write **clearly** in the provided answer boxes; we will not grade work that appears elsewhere. Completely fill in bubbles and square boxes; if we cannot tell which option(s) you selected, you may lose points.
 - ☐ A bubble means that you should only **select one choice**.
 - ☐ A square box means you should **select all that apply**.
 - If your answer is a string, make sure to put it in quotes. If your answer is a float, make sure to include a decimal point.
 - No aids are allowed (no notes, no calculators, and no computers).
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By signing below, you are agreeing that you will behave honestly and fairly during and after this quiz.

Signature:

Version A

Please do not open your quiz until instructed to do so.

Question 1

- a) Suppose that the trees on UCSD's campus have a mean height of 100 feet and a **variance** of 36 feet. If the height of a specific tree is 124 feet, what would its height be in standard units for this distribution? Simplify your answer.

- b) Let A be the answer to the previous question. Choose the best interpretation of A .
- ☐ A randomly selected tree on UCSD's campus has an A percent probability of being at least 124 feet tall.
 - ☐ A 124 foot tree is A times taller than the average tree on UCSD's campus.
 - ☐ A 124 foot tree is A standard deviations taller than the average tree on UCSD's campus.
 - ☐ At least 95% of trees on UCSD's campus have a height within A standard deviations of the mean height.

Question 2

You are told that `scipy.stats.norm.cdf(-1.4)` evaluates to 0.08075665923377107. Suppose you have a standard normal curve with mean at $x = 0$ and standard deviation 1. What is the area under the curve from $x = 0$ to $x = 1.4$? Give your answer as a number rounded to 2 decimal places.

Question 3

Suppose we measure the height in feet of a sample of trees on UCSD's campus and use this sample to generate a 95% CLT-based confidence interval for the mean height of trees on campus. Let W be the width of this confidence interval.

If we instead were to measure the height of the same sample in inches, and again generate a 95% CLT-based confidence interval for the mean, what would be the width of this confidence interval in terms of W ? There are 12 inches in 1 foot.

- ☐ $\frac{W}{12}$ ☐ $\frac{W}{\sqrt{12}}$ ☐ W ☐ $12W$ ☐ $144W$

Question 4

Which of the following quantities must be known in order to construct a CLT-based confidence interval for the population mean? Select all that apply.

- ☐ Shape of the population (normal or not)
- ☐ Shape of the sample (normal or not)
- ☐ Mean of the population
- ☐ Mean of the sample
- ☐ Standard deviation of the population
- ☐ Standard deviation of the sample
- ☐ Size of the population
- ☐ Size of the sample

Question 5

We want to collect a sample of trees and use this sample to determine the proportion of all trees that are oak trees (a population parameter). We want to create a 95% confidence interval that is at most 0.04 wide. Which of the following inequalities should we use to find the smallest viable sample size we could collect?

- ☐ sample size $\geq (4 * \frac{0.5}{0.04})^2$
- ☐ sample size $\geq (2 * \frac{0.5}{0.04})^2$
- ☐ sample size $\geq (4 * \frac{1}{0.04})^2$
- ☐ sample size $\geq (2 * \frac{1}{0.04})^2$

Question 6

Suppose that the trees on UCSD's campus are 35% eucalyptus, 25% pine, and the remaining 40% some other variety. Write **one line of code** to simulate the act of randomly sampling 40 trees from this distribution, with replacement. Your code should output an array of length 3 where the elements represent the number of eucalyptus, pine, and other trees, respectively.