Question 1 (1 point)

Question 1 options:

It is calculated that, in order to estimate the true mean weight of a certain breed of cats to within 5 pounds with 95% confidence, we would need a sample of 50 cats. Weights of this breed of cats are known to follow a normal distribution. How many cats would we need to sample in order to estimate the true mean weight to within 2 pounds with 95% confidence?

As you should always do with sample size determination questions, always **round up** your decimal answer to the next higher number. Enter only a numerical answer (**do not** show any work).

Information

Questions 2 and 3 refer to the following:

Suppose that IQs of adult Canadians follow a normal distribution with standard deviation 15. A random sample of 30 adult Canadians has a mean IQ of 112. At the 3% level of significance, we would like to test whether the true mean IQ of all adult Canadians is more than 110.

Question 2 (1 point)

What is the rejection rule?

Question 3 (1 point)

Calculate the test statistic and use your answer to Question 2 to decide to reject H_0 or fail to reject H_0.

Information

Questions 4 to 8 refer to the following:

We will select a random sample of 15 healthy adults and record their pulse rates. We would like to conduct a hypothesis test to determine whether the mean pulse rate of healthy adults differs from 75 beats per minute. Pulse rates of healthy adults are known to follow a normal distribution with standard deviation 10 beats per minute.

Question 4 (2 points)

Question 4 options:

Using a 5% level of significance, we will reject the null hypothesis if $X \leq$ [_____]

or if $X \geq$ [_____]

Enter only numerical answers (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answers to 4 decimal places.

Question 5 (2 points)

Using a 5% level of significance, what is the power of the test if the true mean pulse rate of all healthy adults is actually 82 beats per minute?

Enter only a numerical answer (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answer to 4 decimal places.

Question 6 (0.5 points)

Would the power you calculated in Question 5 increase or decrease if a 1% level of significance were used?

Question 6 options:

○ A) Increase

◉ B) decrease

Questions 4 to 8 refer to the following:

We will select a random sample of 15 healthy adults and record their pulse rates. We would like to conduct a hypothesis test to determine whether the mean pulse rate of healthy adults differs from 75 beats per minute. Pulse rates of healthy adults are known to follow a normal distribution with standard deviation 10 beats per minute.

Question 7 (0.5 points)

Would the power you calculated in Question 5 increase or decrease if we were to increase the sample size to 50 healthy adults?

Question 7 options:

   ○   A) increase

   ○   B) decrease

Question 8 (0.5 points)

If the true mean pulse rate of healthy adults were actually 85 beats per minute, would the power of this test be higher or lower than your answer in Question 5?

Question 8 options:

   ○ A) higher

   ○ B) lower

Information

The remaining questions refer to the following:

The label on boxes of laundry detergent claims the boxes contain 39 ounces of detergent. There is, however, some variability in the filling process. The amount of laundry detergent per box is known to follow a normal distribution. We take a random sample of 10 boxes and measure the contents. The data are as follows:

39.8 38.6 38.3 39 38 39.6 38.6 38.2 39 37.8

The sample mean and sample standard deviation are calculated to be 38.69 and 0.66, respectively.

Question 9 (1 point)

Question 9 options:
The lower and upper limits of the 90% confidence interval for the true mean amount of detergent per box are

[_____] abc

and

[_____] abc

Enter only numerical answers (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answers to 2 decimal places.

Information

We would like to conduct a hypothesis test to determine if there is sufficient evidence that the mean amount of detergent per box is less than 39.

Question 10 (1 point)

What is the value of the test statistic for the appropriate test of significance? Keep 4 decimal places in intermediate calculations and report your final answer to 2 decimal places.

Question 11 (1 point)

What is the P-value for the appropriate test of significance?

Question 12 (1 point)

At the 10% level of significance, what is the conclusion for this test?

Question 12 options:

   ○   A) Reject H_0

   ○   B) Fail to reject H_0

Question 13 (1 point)

Suppose we had instead used the critical value method to conduct the test. We would reject H_0 if:

Question 13 options:

   ○   A) $t \geq 1.372$

   ○   B) $t \leq -1.833$

   ○   C) $t \leq -1.383$

   ○   D) $|t| \geq 1.812$

   ○   E) $|t| \geq 1.372$

   ○   F) $|t| \geq 1.833$

   ○   G) $t \leq -1.812$

   ○   H) $t \geq 1.383$

   ○   I) $t \geq 1.833$

   ○   J) $t \geq 1.812$

   ○   K) $|t| \geq 1.383$

   ○   L) $t \leq -1.372$