Information

The first **eleven** questions (**1** to **11**) 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.

Question 1 (1 point)

We would like to construct a 97% confidence interval for the true mean IQ of all adult Canadians. What is the critical value to be used in the confidence interval?

Enter only a numerical answer (**do not** show any work). Report your final answer to 2 decimal places.

Question 2 (1 point)

Question 2 options:

The lower and upper limits of the 97% confidence interval for the true mean IQ of all adult Canadians are

and

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.

Question 3 (1 point)

What is the interpretation of the confidence interval obtained in the previous question?

Question 4 (1 point)

Now we would like to conduct a hypothesis test at the 3% level of significance to determine if the true mean IQ of all adult Canadians differs from 105. What will be the conclusion of the hypothesis test?

Question 4 options:

A) Reject H_0

B) Fail to reject H_0

Question 5 (1 point)

Explain how you can arrive at the conclusion in Question 4 using only the calculated confidence interval in Question 2.

Information

The next **six** questions (**6** to **11**) refer to the following:

At the 10% level of significance, a researcher wishes to find evidence that the true mean IQ of adult Canadians is more than 110.

Note: We are still assuming that IQs of adult Canadians follow a normal distribution with standard deviation 15 and a random sample of 30 adult Canadians has a mean IQ of 112.

Question 6 (1 point)

What are the null and alternative hypotheses?

- A) $H_0: \bar{x} = 112$ vs. $H_a: \bar{x} > 112$
- B) $H_0: \mu = 110$ vs. $H_a: \mu > 110$
- C) $H_0: \bar{x} = 110$ vs. $H_a: \bar{x} > 110$
- D) $H_0: \mu = 112$ vs. $H_a: \mu > 112$
- E) $H_0: \mu = 110$ vs. $H_a: \bar{x} > 110$

Question 7 (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 8 (1 point)

What is the P-value of the appropriate test of significance? Report your answer to 4 decimal places.

Question 9 (1 point)

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

Question 9 options:

- A) Reject H_0
- B) Fail to reject H_0

Question 10 (1 point)

What is the interpretation of the conclusion in the previous question?

Question 11 (1 point)

Provide an interpretation of the P-value calculated in Question 8.

Information

The next **two** questions (**12** and **13**) refer to the following:

Now suppose that IQs of adult Canadians follow a normal distribution with unknown standard deviation. Another researcher takes a different sample of 30 adult Canadians, who have a mean IQ of 108 and a standard deviation of 5.

Another researcher believes that the true mean IQ of adult Canadians differs from 110.

Question 12 (1 point)

If the researcher believes that the true mean IQ of adult Canadians differs from 110, then what is the P-value for the appropriate test of significance?

Question 13 (1 point)

We would like to construct a 95% confidence interval for the true mean IQ of all adult Canadians. What is the critical value to be used in the confidence interval?

Enter only a numerical answer (**do not** show any work).

Question 14 (1 point)

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 100 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 4 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).