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)

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?

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: $\overline{x}$ = 112 vs. H_a: $\overline{x}$ > 112

B) H_0:μ = 112 vs. H_a:μ > 112

C) H_0:μ = 110 vs. H_a: $\overline{x}$ > 110

D) H_0: $\overline{x}$ = 110 vs. H_a: $\overline{x}$ > 110

E) H_0: μ = 110 vs. H_a: μ > 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?

- 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.

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).