Question 4: Focus on Inference — 4 points

General Scoring Notes

- This question is scored in three sections. Each section is initially scored by determining if it meets the criteria for essentially correct (E), partially correct (P), or incorrect (I). The first section includes statements of the null and alternative hypotheses and identification of the appropriate hypothesis test. The second section includes verifying the conditions for the test identified in the first section and calculating the value of the test statistic and the corresponding *p*-value. The third section includes the conclusion for the test identified in the first section. The response is then categorized based on the scores assigned to each section and awarded an integer score between 0 and 4 (see the table at the end of the question).
- The model solution represents an ideal response to each section of the question, and the scoring criteria identify the specific components of the model solution that are used to determine the score.

	Model Solution	Scoring
Section 1	An appropriate inference procedure is a one-sample *z*-test for a population proportion. The null hypothesis is $H_0: p = 0.22$, and the alternative hypothesis is $H_a: p > 0.22$, where $p =$ the true proportion of students at Karen's high school that use the application at least once per week.	**Essentially correct (E)** if the response satisfies the following four components: 1. Identifies a one-sample *z*-test for a population proportion by name (e.g., "one-proportion *z*-test" but not merely "one-sample *z*-test") or by formula 2. States the correct equality for the null hypothesis with the value 0.22 3. States the correct direction for the one-sided alternative hypothesis consistent with the null hypothesis 4. Provides sufficient context for the parameter by including reference to the population proportion (true proportion of students at Karen's high school) AND the sampling units (students) AND the response variable (using the application) **Partially correct (P)** if the response satisfies three of the four components required for E. **Incorrect (I)** if the response does not meet the criteria for E or P.

Scoring Notes:

- If the response identifies the correct test by name but also states an unreasonable formula, then component 1 is not satisfied.
- If the response identifies the test using the correct formula but equating it with a *t* instead of a *z*, then component 1 is not satisfied.
- A response that states the null hypothesis as $H_0: p \leq 0.22$ satisfies component 2.

- Components 2 and 3 may be satisfied without regard to the symbol (or lack of symbol) used to represent the population parameter.
- Neither context nor the concept of the population is required to satisfy components 2 or 3.
- A response that states the hypotheses in words (e.g., "the null hypothesis is that the proportion is 0.22, and the alternative hypothesis is that the proportion is greater than 0.22") may satisfy components 2 and 3.
- A response that states the hypotheses in words and refers to the population in context (e.g., "the null hypothesis is that the population proportion of students at Karen's high school that use the application at least once per week is equal to 0.22 and the alternative hypothesis is that the population proportion is greater than 0.22") may satisfy components 2, 3, and 4.
- If the null hypothesis is incorrect, the response can satisfy component 3 with a correct alternative hypothesis.
- The elements of component 4 do not have to be satisfied with the statement of the hypotheses. They may be satisfied with the statement in the hypotheses, definition of the parameter, or the statement of the conclusion.
- If the statement of the hypotheses refers to population proportion and the conclusion refers to sample proportion (or vice versa), then the population aspect of component 4 is not satisfied.
- If the response clearly refers to the **sample** proportion instead of the **population** proportion using a $\hat{p}$, then component 4 is not satisfied unless the symbol used is defined as the **population** proportion.
- A response may satisfy the population aspect of component 4 by the following:
  - Referring to the population by using words such as "population," "all," or "true" when defining the parameter or in the statement of the conclusion of the inferential procedure.
  - Using notation such as p, p_0, or π when defining the hypothesis statements.

Confidence Interval Approach:

- If a one-sample *z*-interval for a population proportion is identified correctly by name (e.g., "one-proportion *z*-interval" but not merely "one-sample *z*-interval") or by formula, then component 1 is satisfied.
- If a response uses a one-sample *z*-interval for a population proportion, then component 4 is satisfied if the response indicates that it is a confidence interval for the true proportion of students at Karen's high school that use the application at least once per week.

	Model Solution	Scoring
Section 2	The independent observation condition for performing the one-sample z-test for a population proportion is satisfied. This is because the data were obtained from a random sample of 130 high school students from Karen's high school. Also, the sample of 130 students is less than 10% of the total number of students at this large high school, because $130 < 0.10(2{,}000)$ and the total number of students in Karen's high school is greater than 2,000. The 10% condition is required as sampling was conducted without replacement from a finite population. The number of expected successes and expected failures were both more than 10 because $130(0.22) = 28.6$ and $130(0.78) = 101.4$. Thus, the sample size is large enough to support the assumption that the sampling distribution of $\hat{p}$ is approximately normal. $\hat{p} = \frac{38}{130} \approx 0.2923$ Test statistic: $z = \frac{0.2923 - 0.22}{\sqrt{\frac{0.22(1-0.22)}{130}}} \approx 1.99$ $P(z > 1.99) \approx 0.023$	**Essentially correct (E)** if the response satisfies the following four components: 1. Checks the independence condition by referring to the random sample of 130 students AND indicates that 130 is less than or equal to 10% of $2{,}000$ (i.e., $(130) \le (0.10)N$) 2. Checks that the sample size is large enough to support the assumption that the sampling distribution of $\hat{p}$ is approximately normal by verifying that the number of expected successes and expected failures were at least 10 by calculating the following values: $np_0 = 130(0.22) = 28.6$ and $n(1-p_0) = 130(0.78) = 101.4$ 3. Correctly reports the value of the z-statistic 4. Reports the value for the correct p-value consistent with the test statistic and the procedure stated in Section 1 **Partially correct (P)** if the response satisfies only two or three of the four components required for E. **Incorrect (I)** if the response does not meet the criteria for E or P.

Scoring Notes:

- To satisfy the reference to the random selection of 130 students in component 1, it is minimally acceptable to state "random sample – check" or "SRS – check." However, component 1 is not satisfied if the response implies that random **assignment** was used or only states "random – check."
- To satisfy component 2, a direct comparison must be made against a standard criterion (5 or 10) using either actual values of the observed successes and failures (38 and 92) OR values for the expected successes and failures (28.6 and 101.4) OR formulas for the expected number of successes and failures with values inserted (or defined elsewhere), such as $130(0.22)$ and $130(1-0.22)$.
- If the response includes an inappropriate check of conditions, such as $n > 30$, then component 2 is not satisfied.
- A response that reports the correct value for the z-statistic but contains errors in supporting work satisfies component 3.
- A response that inputs correct values into the z-statistic formula but computes an incorrect value for the z-statistic, satisfies component 3.

- If the response incorrectly uses the sample proportion in calculating the standard error, the response does not satisfy component 3 but may satisfy component 4 ($z = 1.81$ and $p = 0.0351$).
  - The following combinations of z-statistics and p-values may satisfy component 4 but not component 3: $z = 1.76$ and $p = 0.039$ OR $z = 1.915$ and $p = 0.0276$.
- If the response satisfies component 4, any supporting work for the p-value may be treated as extraneous.
- To satisfy component 4, the p-value must be consistent with the alternative hypothesis and either the reported test statistic OR the correct test statistic (1.99).
- If the response compares the value of the test statistic to a critical value instead of reporting a p-value, then the critical value (1.645), or a critical value consistent with the stated alternative hypothesis, satisfies component 4.
- If the response omits identifying the hypotheses, the correct one-sided alternative hypothesis is assumed when scoring component 4.
- If the response omits a test statistic, the correct test statistic is assumed when scoring component 4.
- If an incorrect alternative hypothesis is stated, then the p-value must be consistent with the stated alternative hypothesis to satisfy component 4.

Confidence Interval Approach:

- If either a one-sided 95% confidence interval is correctly calculated as $(0.227, \infty)$ or a two-sided 90% confidence interval is correctly calculated as $(0.227, 0.358)$, then component 3 is satisfied.
- If the alternative hypothesis corresponds to $H_a: p > 0.22$ and only the lower end of a confidence interval is used to reach a conclusion, then component 4 is satisfied.
- Application of a confidence interval approach must be consistent with the stated alternative to satisfy component 4.
- A two-sided 95% confidence interval is $(0.214, 0.370)$ and does not satisfy component 3.

	Model Solution	Scoring
Section 3	Because this *p*-value is less than the $\alpha = 0.05$ significance level, the null hypothesis should be rejected. There is convincing statistical evidence that the population proportion of students at Karen's high school that use the application at least once per week is greater than Country W's proportion of 0.22.	**Essentially correct (E)** if the response satisfies the following two components: 1. Provides correct comparison of the *p*-value to alpha (*p*-value is less than/greater than alpha) AND provides a correct decision about the null and/or alternative hypothesis 2. States a conclusion in context, consistent with, and in terms of, the alternative hypothesis using nondefinitive language **Partially correct (P)** if the response satisfies only one of the two components required for E. **Incorrect (I)** if the response does not meet the criteria for E or P.

Scoring Notes:

- To satisfy component 1, the response must clearly identify the number that is compared to alpha as a *p*-value (which can be identified anywhere in the response).
- If the comparison and decision are consistent with an incorrect *p*-value (or an incorrect value of the test statistic or an incorrect confidence interval), the response may satisfy component 1. This also applies to incorrect *p*-values that are unreasonable (e.g., $p\text{-value} = 3.2$).
- To satisfy the *p*-value comparison in component 1, the response can compare the value of the test statistic to an appropriate critical value (e.g., $z > 1.645$).
- If the response includes any statement equivalent to "accept the null hypothesis," component 1 is not satisfied.
- An explicit decision (Fail to Reject/Reject) is not required to satisfy component 1. The decision part of component 1 may be satisfied by implying the decision within the conclusion statement (insufficient evidence/sufficient evidence for the alternative hypothesis).
- If an explicit decision is stated and the conclusion is inconsistent with the decision, component 1 is not satisfied.
- To satisfy the context in component 2, the response must reference proportion, students (may be implied), and using the application OR answers the inference question.
- If the response omits hypotheses, assume the correct alternative hypothesis is provided when scoring component 2.
- If the response states incorrect hypotheses, component 2 may be satisfied by either stating a conclusion in terms of the incorrect hypothesis or by stating the conclusion by answering the inference question given in the stem (e.g., "the results from this study do not provide convincing statistical evidence that the proportion of students at Karen's high school that use the application at least once per week is greater than 0.22").
- Definitive language, such as the following, does not satisfy component 2: "proves the null," "proves the alternative," "accepts the alternative," and "there is no evidence for the alternative."
- Nondefinitive language, such as the following, is required to satisfy component 2: "evidence to accept the alternative," "there is evidence for the alternative," and "there is not sufficient evidence for the alternative."

- If components 1 and/or 2 are satisfied and the response provides an incorrect interpretation of the *p*-value, the score is lowered from E to P or P to I.

Confidence Interval Approach:

- If the alternative hypothesis is specified correctly as $H_a: p > 0.22$, then component 1 is satisfied if the justification is based on whether 0.22 is below the lower end of the confidence interval. If the alternative hypothesis is stated in the wrong direction, then component 1 is satisfied if the justification is based on whether 0.22 is above the upper end of the confidence interval.
- If an incorrect two-sided alternative hypothesis is specified, then component 1 is satisfied if the justification is based on whether 0.22 is included in the confidence interval.
- If no alternative hypothesis is specified in the response, then assume the correct alternative hypothesis is provided when scoring component 2.
- If the response includes an incorrect interpretation of the confidence interval, then the score for Section 3 is lowered from E to P or from P to I.

Scoring for Question 4	Score
Complete Response Three sections essentially correct	**4**
Substantial Response Two sections essentially correct and one section partially correct	**3**
Developing Response Two sections essentially correct and no section partially correct *OR* One section essentially correct and one or two sections partially correct *OR* Three sections partially correct	**2**
Minimal Response One section essentially correct and no section partially correct *OR* No section essentially correct and two sections partially correct	**1**

Question 5: Multi-Focus — 4 points

General Scoring Notes

- Each part of the question (indicated by a letter) is initially scored by determining if it meets the criteria for essentially correct (E), partially correct (P), or incorrect (I). The response is then categorized based on the scores assigned to each letter part and awarded an integer score between 0 and 4 (see the table at the end of the question).
- The model solution represents an ideal response to each part of the question and the scoring criteria identify the specific components of the model solution that are used to determine the score.

Model Solution	Scoring
A i. Let random variable X represent the number of bedrooms in a randomly selected newly built house in the 2024 sample from Country B. The probability that a randomly selected house from the 2024 sample had fewer than 3 bedrooms is the probability that the house had either 1 or 2 bedrooms, which is $P(X < 3) = P(X = 1) + P(X = 2)$ $P(X < 3) = 0.12 + 0.22$ $P(X < 3) = 0.34$. ii. The average number of bedrooms per house for the sample of newly built houses in 2024 is $E(X) = 1(0.12) + 2(0.22) + 3(0.28) + 4(0.22) + 5(0.14) + 6(0.02)$ $E(X) = 3.10$ bedrooms.	**Essentially correct (E)** if the response satisfies at least three of the following four components: 1. In part A (i) the response correctly calculates the probability of 0.34. 2. In part A (i) the response provides supporting work or justification for component 1. 3. In part A (ii) the response correctly calculates the mean of 3.10. 4. In part A (ii) the response provides supporting work or justification for component 3. **Partially correct (P)** if the response satisfies only two of the components required for E. **Incorrect (I)** if the response does not meet the criteria for E or P.

Scoring Notes:

- An arithmetic or transcription error in a response can be ignored if correct work is shown.
- Supporting work for finding the expected value must include at least two of the terms in the equation to show the pattern, such as $1(0.12) + 2(0.22) + \ldots$.
- A response to part A (ii) that indicates use of the appropriate formula for the mean of a discrete random variable in words (e.g., "the sum of x times p of x for all values of x") or describes an appropriate method (e.g., using the given distribution to create a hypothetical sample of 100 and then calculating the mean) may satisfy component 4.

Model Solution	Scoring
B i. Let $\mu =$ the population mean number of bedrooms in newly built houses in 2024 from Country B. The null hypothesis is $H_0: \mu = 2.9$ and the alternative hypothesis is $H_a: \mu \neq 2.9$. ii. A Type I error would be determining that the population mean number of bedrooms in newly built houses in 2024 from Country B is not equal to 2.9 when it is in fact 2.9.	**Essentially correct (E)** if the response satisfies the following four components: 1. In part B (i) the response states the correct equality for the null hypothesis with the value 2.9. 2. In part B (i) the response states the correct two-sided alternative hypothesis consistent with the null hypothesis. 3. In part B (i) the response provides sufficient context for the parameter by including a reference to the population mean AND the response variable (bedrooms) AND the sampling units (newly built houses). 4. In part B (ii) the response correctly defines a Type I error in context. **Partially correct (P)** if the response satisfies only three of the four components required for E. **Incorrect (I)** if the response does not meet the criteria for E or P.

Scoring Notes:

- Components 1 and 2 may be satisfied without regard to the symbol (or lack of symbol) used to represent the population parameter.
- Neither context nor the concept of the population is required to satisfy components 1 or 2.
- A response that states the hypotheses in words (e.g., "the null hypothesis is that the mean is 2.9, and the alternative hypothesis is that the mean is not equal to 2.9") may satisfy components 1 and 2.
- A response that states the hypotheses in words AND refers to the population in context (e.g., "the null hypothesis is that the population mean number of bedrooms in newly built houses in 2024 from Country B is equal to 2.9, and the alternative hypothesis is that the population mean number of bedrooms in newly built houses in 2024 from Country B is not equal to 2.9") may satisfy components 1, 2, and 3.
- If the response clearly refers to the **sample** mean instead of the **population** mean using words or a symbol (e.g., $\bar{x}$ or $\hat{\mu}$), then component 3 is not satisfied unless the symbol used is defined as the **population** mean.
- The phrase "mean number of bedrooms" or "mean number of bedrooms for houses" is not sufficient for the population aspect of component 3.
- A response may satisfy the population aspect of component 3 by the following:
  - Referring to the population by using words such as "population," "all," or "true" when defining the parameter.
  - Using notation such as μ when defining the hypothesis statements.
- A response that refers to "bedrooms" OR "rooms" may satisfy context for component 4.

Model Solution	Scoring
C Because the value 2.9 is not contained within the 97% confidence interval, the null hypothesis should be rejected. Therefore, there is convincing statistical evidence, at the $\alpha = 0.03$ level of significance, that the population mean number of bedrooms in newly built houses in 2024 from Country B is not equal to 2.9 (or is different than that in 2017).	**Essentially correct (E)** if the response satisfies the following two components: 1. States a conclusion consistent with and in terms of the alternative hypothesis using nondefinitive language 2. Provides a justification for the conclusion by indicating that 2.9 is not contained within the confidence interval **Partially correct (P)** if the response satisfies only one of the two components required for E. **Incorrect (I)** if the response does not meet the criteria for E or P.

Scoring Notes:

- A response that only provides an interpretation of the given confidence interval is scored I.
- A response may satisfy the conclusion aspect of component 1 by using words such as "there is evidence to support the alternative," "there is statistical evidence that H_a is true," "I am 97% confident there is a difference in means," or "because 2.9 is not included in our interval, it is not a plausible value for the mean."
- If an explicit decision is stated and the conclusion is inconsistent with the decision, component 1 is not satisfied. A response that incorrectly indicates that 2.9 is contained in the confidence interval and then provides an otherwise correct conclusion based on 2.9 being contained in the interval satisfies component 1 but not component 2.
- A response that provides a conclusion that is consistent with an incorrect alternative hypothesis identified in part B satisfies component 1.
- A definitive response that states that the average number of bedrooms is 3.10 (the value of the sample mean or any other number) does not satisfy component 1, even if the response makes additional correct statements about the alternative hypothesis.
- A response that draws a conclusion that is clearly about the sample mean (e.g., a statement about "average number of bedrooms for newly built houses in the study") does not satisfy component 1.
- If the conclusion includes a definitive statement (e.g., "this proves that we have enough evidence that the mean number of bedrooms in newly built homes in 2024 is 2.9" or "Rodney is correct; the mean number of bedrooms in newly built homes in 2004 is 2.9"), then component 1 is not satisfied.
- A response that reverse engineers the given confidence interval to obtain a standard error using a reasonable critical value for a 97% confidence interval and then uses the standard error to compute a *t*-statistic and *p*-value to reach a correct conclusion satisfies component 1 but does not satisfy component 2.

Scoring for Question 5	Score
Complete Response Three parts essentially correct	**4**
Substantial Response Two parts essentially correct and one part partially correct	**3**
Developing Response Two parts essentially correct and no part partially correct *OR* One part essentially correct and one or two parts partially correct *OR* Three parts partially correct	**2**
Minimal Response One part essentially correct and no parts partially correct *OR* No part essentially correct and two parts partially correct	**1**

Question 4: Focus on Inference — 4 points

General Scoring Notes

- This two-part question is scored in four sections. Each section is initially scored by determining if it meets the criteria for essentially correct (E), partially correct (P), or incorrect (I). Part (a) includes three sections that may appear in any order in the response. The first section includes identification of the appropriate confidence interval in part (a). The second section includes verifying the conditions for inference in part (a) and calculating the values of the endpoints of the confidence interval. The third section includes the interpretation of the confidence interval in part (a). The fourth section includes the response to part (b). The response is then categorized based on the scores assigned to each section and awarded an integer score between 0 and 4 (see the table at the end of the question).
- The model solution represents an ideal response to each section of the question, and the scoring criteria identify the specific components of the model solution that are used to determine the score.

	Model Solution	Scoring
(a) Section 1	The appropriate procedure is a one-sample z-interval for the proportion of all teenagers in the United States who would respond that they use a video streaming service every day.	**Essentially correct (E)** if the response satisfies the following two components: 1. Identifies the appropriate procedure as a one-sample z-interval by name or formula or by the calculations of the correct confidence interval endpoint values 2. States that the parameter of interest is the population proportion **Partially correct (P)** if the response satisfies only one of the two components. **Incorrect (I)** if the response does not meet the criteria for E or P.

Additional Notes:

- The response to component 2 concerning the statement of "population proportion" can be found in any of the three sections of part (a).
- Any notation used to represent sample proportion or population proportion should remain consistent throughout part (a).

	Model Solution	Scoring
(a) Section 2	This survey selected a random sample of 920 teenagers in the United States, which enables the interval to be generalized to the population of interest. This sample of 920 teenagers is less than 10% of the total number of teenagers in the United States, which is required as sampling was conducted without replacement from a finite population. In addition, there were more than 10 successes and 10 failures as $(920)(0.59) = 542.8$ (or 543) responded that they use a streaming service daily and $(920)(0.41) = 377.2$ (or 377) responded that they did not. Thus, the sample size is large enough to support the assumption that the sampling distribution of $\hat{p}$ is approximately normal. Therefore, a 95% confidence interval for the population proportion is given by $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.59 \pm 1.96\sqrt{\frac{(0.59)(0.41)}{920}}$, which is 0.59 ± 0.032, and the interval is $(0.558, 0.622)$.	**Essentially correct (E)** if the response satisfies the following four components: 1. States that a random sample was selected 2. Indicates 920 is less than ten percent of all teenagers in the United States 3. Verifies that there are at least 10 successes and failures by calculating the following values $n\hat{p} = (920)(0.59) \approx 542.8$ and $n(1-\hat{p}) = (920)(1-0.59) \approx 377.2$ 4. Reports the values for a correct interval consistent with the procedure stated in Section 1 **Partially correct (P)** if the response satisfies either component 3 or component 4 and at least one of the other three components. **Incorrect (I)** if the response does not meet the criteria for E or P.

Additional Notes:

- Stating the large sample condition without verification is not sufficient for component 3.
- If the response includes an inappropriate check of conditions, such as $n > 30$, then component 3 is not satisfied.
- Supporting work, showing formulas or calculations, is not required for component 4.
- If the interval values are correct, the use of a one-sample z procedure for proportion can be used to satisfy component 1 of Section 1.
- A response that uses the value of $x = 543$ will result in an interval of $(0.5584, 0.6219)$, and a response that uses the value of $x = 542$ will result in an interval of $(0.5573, 0.6209)$. These interval endpoint values may be used to satisfy component 4.
- If the response includes supporting work for calculating the confidence interval that displays a correct formula with correct values inserted for $\hat{p}$, n, and z, then component 4 is satisfied even if values for the endpoints of the confidence interval are not displayed or calculated incorrectly.
- A response that computes an interval in percentages rather than proportions may satisfy component 4 if the response correctly indicates the use of percentages, $(55.8\%, 62.2\%)$.
- Minor errors or omissions when checking assumptions may be considered if holistic scoring is required.

	Model Solution	Scoring
(a) **Section 3**	We can be 95% confident that the proportion of all teenagers in the United States who would respond that they use a streaming service every day is between 0.558 and 0.622.	**Essentially correct (E)** if the response satisfies the following two components: 1. Indicates 95% confidence and interprets the interval using words such as "we are 95% confident" or "with 95% confidence" and provides interval endpoint values consistent with calculations in Section 2 2. Conveys inference about a population proportion in the proper context, i.e., "the true proportion of U.S. teenagers," "the population proportion of U.S. teenagers," or "the proportion of all U.S. teenagers" **Partially correct (P)** if the response satisfies only one of the two components. **Incorrect (I)** if the response does not meet the criteria for E or P.

Additional Notes:

- For component 1, responses that use the same incorrect proportion interval endpoint values calculated in Section 2 satisfies this portion of component 1.
- Section 3 is scored I if the response includes unreasonable values for a proportion or percentage.
- Responses must be consistent with the use of the terms proportion and percentage in component 2. A response that refers to the population percentage must use percentage values to satisfy component 2, and a response that refers to the population proportion must use proportion values.
- Any interpretation of the level of the interval, whether correct or incorrect, is considered extraneous and does not satisfy component 1.
- Clear indication of an inference to the sample of 920 teenagers, rather than the population of teenagers, does not satisfy component 2.
- Section 3 is scored I if it implies that the population proportion is a random variable. For example, it indicates that there is a 95 percent chance that the population proportion is between 0.558 and 0.622.
- A response that implies that we have found the actual percentage of U.S. teenagers who respond that they use a streaming service (deterministic) does not satisfy component 1.

	Model Solution	Scoring
(b) **Section 4**	The 95% confidence interval of $(0.558, 0.622)$ indicates that any value between 0.558 and 0.622 is a plausible value for the proportion of all teenagers in the United States who use video streaming every day. Because the value 0.5 is not contained in the interval, the sample data provide convincing statistical evidence that the proportion of all teenagers in the United States who would use a streaming service every day is not 0.5.	**Essentially correct (E)** if the response satisfies the following two components: 1. Provides a correct conclusion (there is convincing evidence or there is not convincing evidence that 0.50 is a plausible value), consistent with the interval calculated in part (a) 2. Provides correct justification based on whether the value of 0.5 is contained in the interval calculated in part (a) **Partially correct (P)** if the response satisfies only one of the two components. **Incorrect (I)** if the response does not meet the criteria for E or P.

Additional Notes:

- Any use of a hypothesis test to answer Section 4 cannot be used to satisfy component 2. However, the statement of a conclusion that 0.50 is not a plausible value based on the results of the hypothesis test can be used to satisfy component 1.
- A response that correctly uses incorrectly calculated proportion interval endpoint values can satisfy components 1 and 2 if the response is consistent with interval values.
- A response that includes a correct interpretation of the confidence interval in Section 4 can receive credit for the interpretation in Section 3 if no interpretation was provided in Section 3.
- A response that presents a correct conclusion in the context of the population percentage may satisfy both component 1 and component 2.
- A response that indicates that there is evidence that the proportion of teenagers in the United States who would use a streaming service every day is greater than 0.5 based on the fact that the entire confidence interval is above 0.5 may satisfy both component 1 and component 2.
- A response that does not provide the correct conclusion and justification but does recognize that the value is not in the interval may be considered a positive if holistic scoring is required.

Scoring for Question 4 Each essentially correct (E) part counts as 1 point, and each partially correct (P) part counts as ½ point.	**Score**
Complete Response	**4**
Substantial Response	**3**
Developing Response	**2**
Minimal Response	**1**
If a response is between two scores (for example, 2 ½ points), use a holistic approach to decide whether to score up or down, depending on the strength of the response and quality of the communication.	