Question ID c7a13932

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	Medium

ID: c7a13932

Based on a random sample from a population, a researcher estimated that the mean value of a certain variable for the population is 20.5, with an associated margin of error of 1. Which of the following is the most appropriate conclusion?

A. It is plausible that the actual mean value of the variable for the population is between 19.5 and 21.5.

B. It is not possible that the mean value of the variable for the population is less than 19.5 or greater than 21.5.

C. Every value of the variable in the population is between 19.5 and 21.5.

D. The mean value of the variable for the population is 20.5.

ID: c7a13932 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that based on a random sample from a population, the estimated mean value for a certain variable for the population is 20.5, with an associated margin of error of 1. This means that it is plausible that the actual mean value of the variable for the population is between $20.5 - 1$ and $20.5 + 1$. Therefore, the most appropriate conclusion is that it is plausible that the actual mean value of the variable for the population is between 19.5 and 21.5.

Choice B is incorrect. The estimated mean value and associated margin of error describe only plausible values, not all the possible values, for the actual mean value of the variable, so this is not an appropriate conclusion.

Choice C is incorrect. The estimated mean value and associated margin of error describe only plausible values for the actual mean value of the variable, not all the possible values of the variable, so this is not an appropriate conclusion.

Choice D is incorrect. Since 20.5 is the estimated mean value of the variable based on a random sample, the actual mean value of the variable may not be exactly 20.5. Therefore, this is not an appropriate conclusion.

Question Difficulty: Medium

Question ID a22f737f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	Medium

ID: a22f737f

A company that produces socks wants to estimate the percent of the socks produced in a typical week that are defective. A random sample of 310 socks produced in a certain week were inspected. Based on the sample, it is estimated that 12% of all socks produced by the company in this week are defective, with an associated margin of error of 3.62%. Based on the estimate and associated margin of error, which of the following is the most appropriate conclusion about all socks produced by the company during this week?

A. 3.62% of the socks are defective.

B. It is plausible that between 8.38% and 15.62% of the socks are defective.

C. 12% of the socks are defective.

D. It is plausible that more than 15.62% of the socks are defective.

ID: a22f737f Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that, based on the sample, an estimate of 12% of all socks produced by the company in a certain week are defective, with an associated margin of error of 3.62%. This estimate, plus or minus the margin of error, gives an interval of plausible values for the actual percent of all socks produced by the company that week that are defective. Subtracting 3.62% from 12% yields 8.38%. Adding 3.62% to 12% yields 15.62%. Therefore, it is plausible that between 8.38% and 15.62% of all socks produced by the company are defective.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect. 12% is the estimated percent of defective socks based on the sample. However, since the margin of error for this estimate is known, the most appropriate conclusion is not that the percent of defective socks is exactly 12% but instead that it lies in an interval of plausible percents.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Medium

Question ID 1e7832f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	Medium

ID: 1e7832f1

A sample consisting of 720 adults who own televisions was selected at random for a study. Based on the sample, it is estimated that 32% of all adults who own televisions use their televisions to watch nature shows, with an associated margin of error of 3.41%. Which of the following is the most plausible conclusion about all adults who own televisions?

A. More than 35.41% of all adults who own televisions use their televisions to watch nature shows.

B. Between 28.59% and 35.41% of all adults who own televisions use their televisions to watch nature shows.

C. Since the sample included adults who own televisions and not just those who use their televisions to watch nature shows, no conclusion can be made.

D. Since the sample did not include all the people who watch nature shows, no conclusion can be made.

ID: 1e7832f1 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that based on a sample selected at random, it's estimated that 32% of all adults who own televisions use their televisions to watch nature shows, with an associated margin of error of 3.41%. Subtracting the margin of error from the estimate and adding the margin of error to the estimate gives an interval of plausible values for the true percentage of adults who own televisions who use their televisions to watch nature shows. This means it's plausible that between $32\% - 3.41\%$, or 28.59%, and $32\% + 3.41\%$, or 35.41%, of all adults who own televisions use their televisions to watch nature shows. Therefore, of the given choices, the most plausible conclusion is that between 28.59% and 35.41% of all adults who own televisions use their televisions to watch nature shows.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect. To make a plausible conclusion about all adults who own televisions, the sample must be selected at random from all adults who own televisions, not just those who use their televisions to watch nature shows.

Choice D is incorrect. Since the sample was selected at random from all adults who own televisions, a plausible conclusion can be made about all adults who own televisions.

Question Difficulty: Medium

Question ID 2c3af914

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	Medium

ID: 2c3af914

From a population of $50,000$ people, $1,000$ were chosen at random and surveyed about a proposed piece of legislation. Based on the survey, it is estimated that 35% of people in the population support the legislation, with an associated margin of error of 3%. Based on these results, which of the following is a plausible value for the total number of people in the population who support the proposed legislation?

A. 350

B. 650

C. $16,750$

D. $31,750$

ID: 2c3af914 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that an estimated 35% of people in the population support the legislation, with an associated margin of error of 3%. Subtracting and adding the margin of error from the estimate gives an interval of plausible values for the true percentage of people in the population who support the legislation. Therefore, it's plausible that between 32% and 38% of people in this population support the legislation. The corresponding numbers of people represented by these percentages in the population can be calculated by multiplying the total population, $50,000$, by 0.32 and by 0.38, which gives $50,000(0.32) = 16,000$ and $50,000(0.38) = 19,000$, respectively. It follows that any value in the interval $16,000$ to $19,000$ is a plausible value for the total number of people in the population who support the proposed legislation. Of the choices given, only $16,750$ is in this interval.

Choice A is incorrect. This is the number of people in the sample, rather than in the population, who support the legislation.

Choice B is incorrect. This is the number of people in the sample who do not support the legislation.

Choice D is incorrect. This is a plausible value for the total number of people in the population who do not support the proposed legislation.

Question Difficulty: Medium

Question ID 7a234b15

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	Medium

ID: 7a234b15

A company fills boxes with approximately 23 pounds of oranges. To test the accuracy of the filling process, 344 boxes of oranges were selected at random and weighed. Based on the sample, it is estimated that the average weight of all boxes of oranges filled by the company in an 8-hour period is 23.1 pounds, with an associated margin of error of 0.19 pounds. Which of the following is the best interpretation of this estimate?

A. Plausible values for the average weight of all boxes of oranges filled by the company are between 22.91 pounds and 23.29 pounds.

B. Plausible values for the average weight of all boxes of oranges filled by the company are less than 22.91 pounds or greater than 23.29 pounds.

C. The average weight of all boxes of oranges filled by the company is less than 23.01 pounds.

D. The average weight of all boxes of oranges filled by the company is greater than 23.01 pounds.

ID: 7a234b15 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the estimate for the average weight of all boxes of oranges filled by the company in an 8-hour period is 23.1 pounds, with an associated margin of error of 0.19 pounds. It follows that plausible values for this average weight are between $23.1 - 0.19$ pounds and $23.1 + 0.19$ pounds. Therefore, plausible values for the average weight of all boxes of oranges filled by the company are between 22.91 pounds and 23.29 pounds.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 591db6cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	Medium

ID: 591db6cf

To estimate the proportion of a population that has a certain characteristic, a random sample was selected from the population. Based on the sample, it is estimated that the proportion of the population that has the characteristic is 0.49, with an associated margin of error of 0.04. Based on this estimate and margin of error, which of the following is the most appropriate conclusion about the proportion of the population that has the characteristic?

A. It is plausible that the proportion is between 0.45 and 0.53.

B. It is plausible that the proportion is less than 0.45.

C. The proportion is exactly 0.49.

D. It is plausible that the proportion is greater than 0.53.

ID: 591db6cf Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the estimate for the proportion of the population that has the characteristic is 0.49 with an associated margin of error of 0.04. Subtracting the margin of error from the estimate and adding the margin of error to the estimate gives an interval of plausible values for the true proportion of the population that has the characteristic. Therefore, it's plausible that the proportion of the population that has this characteristic is between 0.45 and 0.53.

Choice B is incorrect. A value less than 0.45 is outside the interval of plausible values for the proportion of the population that has the characteristic.

Choice C is incorrect. The value 0.49 is an estimate for the proportion based on this sample. However, since the margin of error for this estimate is known, the most appropriate conclusion is not that the proportion is exactly one value but instead lies in an interval of plausible values.

Choice D is incorrect. A value greater than 0.53 is outside the interval of plausible values for the proportion of the population that has the characteristic.

Question Difficulty: Medium