Week 1 Quiz

测验, 7 个问题

6/7 分 (85%)

✔ 恭喜！您通过了！

下一项

✔ 1 / 1 分

1。
We want to estimate the average coffee intake of Coursera students, measured in cups of coffee. A survey of 1,000 students yields an average of 0.55 cups per day, with a standard deviation of 1 cup per day. Which of the following is **not necessarily true**?

- $\bar{x} = 0.55, s = 1$
- 0.55 is a point estimate for the population mean.
- The sample distribution is right skewed.
- ◉ $\mu = 0.55, \sigma = 1$

正确

This question refers to the following learning objective(s): Define sample statistic as a point estimate for a population parameter, for example, the sample mean is used to estimate the population mean, and note that point estimate and sample statistic are synonymous.

Just because the sample statistics are these values doesn't mean the population values will be exactly equal to them, therefore it's not necessarily true that $\mu = 0.55, \sigma = 1$.

✔ 1 / 1 分

2。
Which of the following is **false**?

- Standard error computed based on a sample standard deviation will always be lower than the standard deviation of that sample.

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As the sample size increases, the variability of the sampling distribution decreases.

Standard error measures the variability in means of samples of the same size taken from the same population.

In order to reduce the standard error by half, sample size should be doubled.

正确

Since n is underneath a square root in the denominator of the formula for standard error. Because of the square root, to reduce the standard error by half you would actually need a sample size four times (2^2) as high.

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1 / 1 分

3。

Students are asked to count the number of chocolate chips in 22 cookies for a class activity. They found that the cookies on average had 14.77 chocolate chips with a standard deviation of 4.37 chocolate chips. After collecting the data, a student reports the standard error of the mean to be 0.93 chocolate chips. What is the **best** way to interpret the student's result?

0.93 chocolate chips is a measure of the variability in the mean number of chocolate chips across all chocolate chip cookies.

The student either made a calculation error or his result is meaningless, because it does not make sense to talk about 0.93 chocolate chips.

0.93 chocolate chips is a measure of the variability we'd expect in calculations of the mean number of chocolate chips if we took repeated random samples of 22 cookies.

正确

This question refers to the following learning objective(s):
Distinguish standard deviation (σ or s) and standard error (SE): standard deviation measures the variability in the data, while standard error measures the variability in point estimates from different samples of the same size and from the same population, i.e. measures the sampling variability.

0.93 is the standard deviation of the number of chocolate chips in a chocolate chip cookie.

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0 / 1 分

4。
Which of the following is false about the central limit theorem (CLT)?

- If we take more samples from the original population, the sampling distribution is more likely to be nearly normal.
- If the population distribution is normal, the sampling distribution of the mean will also be nearly normal, regardless of the sample size.

这个选项的答案不正确
This question refers to the following learning objective(s):

Recognize that the Central Limit Theorem (CLT) is about the distribution of point estimates, and that given certain conditions, this distribution will be nearly normal.

- In the case of the mean the CLT tells us that if

(1a) the sample size is sufficiently large $(n \geq 30)$ and the data are not extremely skewed or

(1b) the population is known to have a normal distribution, and

(2) the observations in the sample are independent,

then the distribution of the sample mean will be nearly normal, centered at the true population mean and with a standard error of $\frac{\sigma}{\sqrt{n}}$.

$$\bar{x} \sim N\left(mean = \mu, SE = \frac{\sigma}{\sqrt{n}}\right)$$

- When the population distribution is unknown, condition (1a) can be checked using a histogram or some other visualization of the distribution of the observed data in the sample.
- The larger the sample size (n), the less important the shape of the distribution becomes, i.e. when n is very large the sampling distribution will be nearly normal regardless of the shape of the population distribution.

Review the associated learning objective.

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The CLT states that the sampling distribution will be centered at the true population parameter.

As the sample size increases, the sampling distribution of the mean is more likely to be nearly normal, regardless of the shape of the original population distribution.

✔ 1 / 1 分

5。
A random sample of 100 runners who completed the 2012 Cherry Blossom 10 mile run yielded an average completion time of 95 minutes. A 95% confidence interval calculated based on this sample is 92 minutes to 98 minutes. Which of the following is false based on this confidence interval?

The margin of error of this confidence interval is 3 minutes.

We are 95% confident that the true average finishing time of all runners who completed the 2012 Cherry Blossom 10 mile run is between 92 minutes and 98 minutes.

✔ 95% of the time the true average finishing time of all runners who completed the 2012 Cherry Blossom 10 mile run is between 92 minutes and 98 minutes.

正确

This question refers to the following learning objective(s):

- Interpret a confidence interval as “We are XX% confident that the true population parameter is in this interval”, where XX% is the desired confidence level.
- Define margin of error as the distance required to travel in either direction away from the point estimate when constructing a confidence interval.

The "true average finishing time" is a fixed number whose exact value we do not know. So it does not make sense to talk about the true average finishing time being between two numbers "95\% of the time".

Based on this 95% confidence interval, we would reject a null hypothesis stating that the true average finishing time of all runners who completed the 2012 Cherry Blossom 10 mile run is 90 minutes.

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1 / 1 分

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6。

All but one of the following confidence intervals has a margin of error of 0.7. Which is the confidence interval with the different margin of error?

- (20.3,21.7)
- (−0.5,0.9)
- (1.6,4.4)

正确

This question refers to the following learning objective(s):

- Recognize that when the sample size increases we would expect the sampling variability to decrease.
- Define margin of error as the distance required to travel in either direction away from the point estimate when constructing a confidence interval, i.e. $z^\star \times SE$.

The width of a confidence interval is 2 times the margin of error, since we add and subtract the same margin of error to the sample statistics to obtain the bounds of the confidence interval. To solve this question we need to calculate the margin of error using this rule for each choice:

$$|(1.6 - 4.4)/2| = 1.4$$

- (−4.7,−3.3)

1 / 1 分

7。

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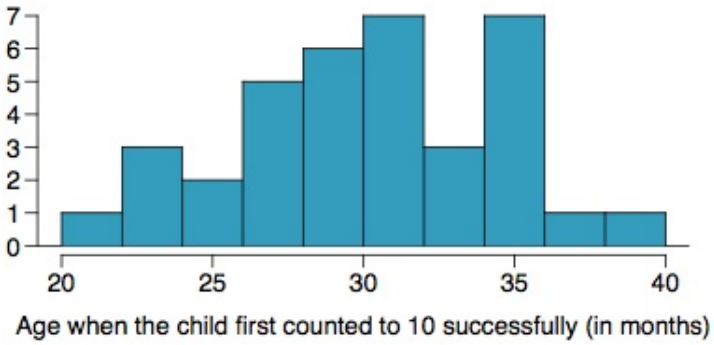
Researchers investigating characteristics of gifted children collected data from schools in a large city on a random sample of thirty-six children who were identified as gifted children soon after they reached the age of four. The following histogram shows the distribution of the ages (in months) at which these children first counted to 10 successfully. Also provided are some sample statistics.

Calculate a 90% confidence interval for the average age at which gifted children first count to 10 successfully. Choose the closest answer.



n	36
min	21
mean	30.69
sd	4.31
max	39

- (30.49, 30.89)
- (29.50, 31.88)

正确

This question refers to the following learning objective(s):
Recognize that the nearly normal distribution of the point estimate (as suggested by the CLT) implies that a confidence interval can be calculated as

$$point\ estimate \pm z^\star \times SE,$$

where $z^\star$ corresponds to the cutoff points in the standard normal distribution to capture the middle XX\% of the data, where XX\% is the desired confidence level.

- For means this is: $\bar{x} \pm z^\star \frac{s}{\sqrt{n}}$
- Note that $z^\star$ is always positive.

The 90% confidence interval can be calculated as follows:

$$\begin{aligned} \bar{x} \pm z^\star se(\bar{x}) &= 30.69 \pm 1.65 \times \frac{4.31}{\sqrt{36}} \\ &= 30.69 \pm 1.19 \\ &= (29.50, 31.88) \end{aligned}$$

- (30.12, 31.26)

(29.28, 32.10)

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