AP Statistics

2019-02-15 6.1 Assignment

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Pg. 546-549 1,3,7,9,11,13,15,19,21,23,25,27-30

Question 1

p = population proportion of students in the high school who are left handed

H[0]: p = 0.12

H[a]: p ≠ 0.12

Question 3

μ = population mean score on the SSHA

H[0]: $\mu = \bar{x}$

H[a]: $\mu > \bar{x}$

Question 7

The null hypothesis (H[0]) must always compare p to the stated value, so H[0]: p = 0.37. The alternate hypothesis should be H[a]: p > 0.37.

Question 9

The hypothesis should use a parameter instead of a statistic (μ instead of $\bar{x}$). H[0]: μ = 1000g and H[a]: μ < 1000g

Question 11

Part A

If the population proportion is in fact 0.12 then there is a 21.84% chance that a sample proportion of 0.16 or higher (as in the sample) would be obtained.

Part B

There is not convincing evidence to reject the null hypothesis as 21.84% is statistically sufficient.

Question 13

Part A

If the population mean is 115, there is a 1.01% chance that a random sample would result in this outcome.

Part B

We can reject the null hypothesis if $\alpha=0.05$ (as $P=0.0101$ is less than α) and confirm the null hypothesis if $\alpha=0.01$ (as $P > \alpha$)

Question 15

This is not true. The P-value describes the probability that the sample's result (or a more extreme result) would be obtained in another random sample of the population given that the original parameter is indeed true. Furthermore, the probability that the null hypothesis is true is either 0 or 1.

Question 19

Part A

μ = Mean response time

H[0]: μ = 6.7 minutes

H[a]: μ < 6.7

Part B

Type I: We conclude that the response time has decreased when it has not. This leads to a decreased effort in shortening response times.

Type II: We conclude that the response time has not decreased when it had in fact decreased. This leads to more effort than necessary towards decreasing response times.

Part C

A Type I error as this would cause less resources than needed to be allocated towards decreasing response times, potentially making them even worse.

Question 21

Part A

μ = mean income

H[0]: μ = 85000$

H[a]: μ < 85000$

Part B

Type I: The mean income is in fact ≥ 85000$, however, we conclude that it is not. This would cause us not to open the restaurant when it would have made profit.

Type II: The mean income is below 85000$, however, we conclude that it is above. This would cause the restaurant to open and lose money [more severe effect].

Part C

A restaurant is a large investment so a small significance level (0.01) would most decrease the potential of making the wrong decision.

Question 23

P(I error) = α = 0.05

P(II error) = 1 - power = 1 - 0.78 = 0.22

Question 25

Part A

The power describes the P(II error) which is the probability that the null hypothesis is in fact false, however, is not rejected (believed to be true).

Part B

More measurements increases the amount of information we have about the data and the reliability of it. More measurements = a greater sample = more confidence in our sample data.

Part C

The probability of a Type I error decreases, therefore, the probability of a Type II error increases.

Part D

The power increases as it is more likely for us to disprove the null hypothesis, decreasing 1-power therefore increasing the power.

Question 27: **D**

Question 28: **B**

Question 29: **A**

Question 30: **B**