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| Photo displaying partial image of two pie charts on a canvas-textured page |
| Advertising Analysis  Assignment-3 |
| |  |  |  | | --- | --- | --- | | Jay Panchal – 100960958 | 6/22/24 | Statistical and Predictive Modeling | |

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# **Question 1:**

## **Hypothesis Statement:**

As the marketing department we want to test **if** the mean sales for Ad2 are greater than 55,000 units, **then** Ad2 has a significant effect on sales compared to Ad1.

# **Question 2:**

## **Step-by-step Outline:**

**Step 1: Null hypothesis (H0) and Alternative hypothesis (Ha)**

**Ho: μ = μo:** **If** Ad2 has **no significant** effect on sales, **then** its mean weekly sales are 55,000 units.

**Ha: μ > μo:** **If** Ad2 has **significant** effect on sales, **then** its mean weekly sales are greater than 55,000 units.

We have the following setup:

Ho: μ = 55,000

Ha: μ > 55,000

**Step 2: The significance level (α) = 0.05**

**Step 3 & 4: Choose which test we need to perform & Calculate One sample T-test**

* In this case, we only have a single sample of Ad2 with sample size less than 30 and unknown standard deviation of population which perfectly fit for one sample T-test requirements.

m - sample mean of Ad2

μ - Population mean under the null hypothesis (55,000)

s - sample standard deviation

n - sample size (number of weeks, which is 20 in this case)

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* **Calculate t-test**

#One Sample t-test – Greater than 55,000

t.test(SamsungAdAnalysis, mu=55000, alternative = "greater")

**One Sample t-test**

data: SamsungAdAnalysis

t = 0.89397, df = 19, p-value = 0.1913

alternative hypothesis: true mean is greater than 55000

95 percent confidence interval:

54066.25 Inf

sample estimates:1

mean of x

55999.5

**Step 5: Conclusion: Either support or reject the null hypothesis.**

We fail to reject the null hypothesis at a 95% confidence level since the p-value of 0.1913 is greater than the significance level of 0.05. This means that at a 5% significance level, we do not have enough evidence to conclude that the mean weekly sales for Ad2 are greater than 55,000 units. Therefore, we cannot confirm that Ad2 has significantly increased sales compared to Ad1.

# **Question 3:**

## **Conducting Analysis in R**

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**Result:**

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# **Question 4:**

## **Summary and findings and conclusion.**

* In this analysis, we aimed to determine whether Ad2 had a significant effect on sales of the Galaxy S23 Ultra compared to the established mean sales of Ad1, which is 55,000 units per week. Using data collected over 20 weeks, we performed a one sample t-test to compare the mean sales of Ad2 against this benchmark. The test was chosen because we have a single sample of Ad2, with a sample size of less than 30, and an unknown population standard deviation.
* The results of the one sample t-test showed a t-value of 0.89397 and a p-value of 0.1913. Given the significance level of 0.05, the p-value was higher than our threshold for rejecting the null hypothesis. The 95% confidence interval for the mean sales of Ad2 ranged from 54,066.25 to infinity, with a sample mean of 55,999.5 units. This suggests that while the sample mean is slightly above 55,000 units, the evidence is not strong enough to conclusively state that Ad2 has significantly increased sales.
* Therefore, we fail to reject the null hypothesis, concluding that there is insufficient evidence to support the claim that Ad2 significantly boosts sales over the benchmark of 55,000 units per week. As a result, based on the collected data, we cannot confirm that Ad2 has a significant positive impact on the sales of the Galaxy S23 Ultra compared to Ad1.