**Any indication of cheating will result in BOTH students receiving a ZERO.**

**Name: Khushal Kishor Mohite**

**ZID: Z1863931**

***Part One: Hypothesis Testing (t-test)***

Call centers typically have high turnover. The director of human resources for a large bank has compiled data on about 70 former employees at one of the bank’s call centers in the data file (Part One). In writing an article about call center working conditions, a reporter has claimed that the average tenure is greater than 2 years. Import the dataset into R and conduct t-test (use α=0.05). Answer below questions based on the result.

1. Is this one-sample t-test or two-sample t-test?

**Answer: One-Sample**

1. State the null and alternative hypotheses. Based on the hypotheses, is it upper-, lower-, or two-tailed test?

**H0: μ <= 2**

**H1: μ > 2**

**Type: upper-tailed test**

1. Take a screenshot of t-test results and paste it here.

A screenshot of a social media post

Description automatically generated

1. Can the claim “the average tenure is greater than 2 years” be accepted? Why or why not? What’s the conclusion of this test?

**Answer: The p-value for our case is greater than the desired level of significance, i.e. p-value > alpha. P-value = 0.78 and alpha = 0.05. Since this is the case, we fail to reject the null hypothesis H0: μ <= 2. Therefore, we cannot accept the claim “the average tenure is greater than 2 years” and we conclude that the average tenure is less than or equal to 2 years. The results of the test indicate that the claim is false.**

***Part Two: Hypothesis Testing (ANOVA)***

Suppose the National Transportation Safety Board (NTSB) wants to examine the safety of compact cars, midsize cars, and full-size cars. (the lower index, the higher safety). It collects a sample of three for each of the treatments (car types). Import the dataset into R and conduct ANOVA test to check whether the mean pressure applied to the driver’s head during a crash test is equal for each types of car. Use α=0.05.

1. State the null and alternative hypotheses

**H0: μ1 = μ2 = μ3**

**H1: μ1 <> μ2 or μ2 <> μ3 or μ1 <> μ3; At least one pair of means are not equal**

1. Take a screenshot of the results of ANOVA and TukeyHSD tests; Paste them here.

A screenshot of a social media post

Description automatically generated

A screenshot of a cell phone

Description automatically generated

1. Can we reject the null hypothesis? Why or why not? What is the conclusion of this test?

**Answer: Based on the results of ANOVA test, we observe that the P-value is smaller than the desired level of significance, alpha. P-value = 0.001 and Alpha = 0.05. Since, P-value < alpha, we reject the null hypothesis. This indicates that the mean pressure applied to the driver’s head during a crash test is not equal for at least one pair of types of car. Hence, we accept the alternate hypothesis that at least one pair of means is not equal.**

1. Based on the results, is there any significant difference on the mean of safety among three types of car?

**Answer: Based on the TukeyHSD test results, we observe a significant difference between the means of safety for the pairs of carsizes *fullsize-compact* and *midsize-compact*. This difference is understood based on the P-values for the pairs.**

**The P-value for the pair of means *fullsize-compact* is smaller than the desired level of significance, alpha. P-value = 0.001 and alpha = 0.05. Hence, the means of safety for car types fullsize and compact are not equal and vary significantly from each other.**

**The P-value for the pair of means *midsize-compact* is smaller than the desired level of significance, alpha. P-value = 0.002 and alpha = 0.05. Hence, the means of safety for car types midsize and compact are not equal and vary significantly from each other.**