# **Hypothesis Testing for Two Population Means**

## **Project Description:**

The present study shows data for salaries of accounting and marketing graduates of a business school at the end of the first year after graduation. The office of career services would like to test the claim (null hypothesis) that the average salary of accounting students is less or equal to the average salary of marketing students, against the alternative that the average salary of accounting student is higher than the average salary of marketing students. The office of career services collects a random sample of salaries of accounting and marketing students.
We will use the Excel Data Analysis Add-in to test the claim and find the averages and variances for the salaries in the sample, the critical value(s) that define(s) the rejection region, the test statistic and the observed level of significance. We will compare the test statistic with our critical value(s) and decide if we should reject or not reject the null hypothesis. We will use different alpha levels to test the hypothesis. We will find the observed level of significance using an Excel formula. We will identify possible errors made and their types. Assume that the distribution of the salaries is normal and the sample is randomly selected.

## **Steps to Perform:**

| **Step** | **Instructions** | **Points Possible** |
| --- | --- | --- |
| 1 | Use a cell reference or a single formula where appropriate in order to receive full credit. Do not copy and paste values or type values, as you will not receive full credit for your answers.  Start Excel. Download and open the workbook named: **Hypothesis\_Testing\_for\_Two\_Population\_Means\_Start** | 0 |
| 2 | On the Data sheet, go to the **Data Tab** and click on **Data Analysis**. Double click on the "t-Test: Two-Sample Assuming Equal Variances." For **Variable 1 Range**, select A1:A71 and for **Variable 2 Range**, select B1:B61. Type **0** for the **Hypothesized Mean Difference**.  Check the **Labels** box, keep the default **alpha=0.05** and select **Output Range** under **Output Option**. Type **D1**. | 3 |
| 3 | In cell C4, find the mean for the sample of accounting students' salaries from the Data Analysis output table on the Data sheet. | 3 |
| 4 | In cell C5, find the variance of the accounting students' salaries from the Data Analysis output table on the Data sheet. | 3 |
| 5 | In cell C6, find the sample size of the accounting students from the Data Analysis output table on the Data sheet. | 3 |
| 6 | In cell C7, find the mean for the sample of marketing students' salaries from the Data Analysis output table on the Data sheet. | 3 |
| 7 | In cell C8, find the variance of the marketing students' salaries from the Data Analysis output table on the Data sheet. | 3 |
| 8 | In cell C9, find the sample size of the marketing students from the Data Analysis output table on the Data sheet. | 3 |
| 9 | In cell C10, find the pooled variance for the two samples from the Data Analysis output table on the Data sheet. | 3 |
| 10 | In cell C11, find the degrees of freedom for the two samples from the Data Analysis output table on the Data sheet. | 3 |
| 11 | The office of career services would like to test the claim (null hypothesis) that the average salary of accounting students is less than or equal to the average salary of marketing students, against the alternative hypothesis that the average salary of accounting students is higher than the average salary of marketing students. Is this a two-sided test? Choose the correct answer from the dropdown menu in cell C12. | 6 |
| 12 | In cell C13, find the value of the test statistic from the Data Analysis output table on the Data sheet. | 5 |
| 13 | In cell C14, find the critical value from the Data Analysis output table on the Data sheet. | 5 |
| 14 | What is the sign of the critical value in C14? Choose your answer from the dropdown menu in cell C15. | 6 |
| 15 | By assessing the values in cells C13, C14, and C15, do you reject the null hypothesis? Choose your answer from the dropdown menu in cell C16. | 6 |
| 16 | Justify the answer you chose in cell C16. Choose your answer from the dropdown menu in cell C17. | 6 |
| 17 | Based on your answer in cell C17, we can conclude at alpha = 0.05 that: Choose the correct answer from the dropdown menu in cell C18. | 6 |
| 18 | In cell C19, find the observed level of significance (p-value) for the test from the Data Analysis output table on the Data sheet. | 3 |
| 19 | In cell C20, test the null hypothesis.  Hint: use the T.TEST function. | 6 |
| 20 | By considering the p-value, can the same conclusion be made about rejecting or not rejecting the claim at alpha = 0.05? Choose your answer from the dropdown menu in cell C21. | 6 |
| 21 | If the level of significance (alpha) was reduced to 0.01, would you reject the null hypothesis that the average salary of accounting students is lower than the average salary of marketing students? Choose your answer from the dropdown menu in cell C22. | 6 |
| 22 | Based on your answer in cell C21, what type of error might have been made? Choose your answer from the dropdown menu in cell C23. | 6 |
| 23 | Based on your answer in cell C22, what type of error might have been made? Choose your answer from the dropdown menu in cell C24. | 6 |
| 24 | Save your file and submit for grading. | 0 |

|  |  |
| --- | --- |
| **Total Points** | **100** |