# Lab 4

One-Sample T: Weight

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| N | Mean | StDev | SE Mean | 95% CI for μ |
| 50 | 49.840 | 6.804 | 0.962 | (47.906, 51.774) |

*μ: mean of Weight*

Test

|  |  |
| --- | --- |
| Null hypothesis | H₀: μ = 50 |
| Alternative hypothesis | H₁: μ ≠ 50 |

|  |  |
| --- | --- |
| T-Value | P-Value |
| -0.17 | 0.869 |



Conclusion:

The graph of box and whisker plot and histogram shows that the data is left skewed i.e. not normally distributed. Hence, t-test for mean is not valid test for population mean because it violates the fundamental assumptions that the data is normally distributed. The alternative test could be Wilcoxon signed rank test or sign test.

Further p-value=0.685>α-value=0.05, we accept the null hypothesis that the mean weight of metal ring is 50 ounces. The 95% confidence interval for population mean (µ) is 47.75 ounce to 51.49 ounce.

# Lab 5

Two-Sample T-Test and CI: New Machine, Old Machine

Method

|  |
| --- |
| μ₁: mean of New Machine |
| µ₂: mean of Old Machine |
| Difference: μ₁ - µ₂ |

*Equal variances are assumed for this analysis.*

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | N | Mean | StDev | SE Mean |
| New Machine | 10 | 42.140 | 0.683 | 0.22 |
| Old Machine | 10 | 43.230 | 0.750 | 0.24 |

Estimation for Difference

|  |  |  |
| --- | --- | --- |
| Difference | Pooled StDev | 95% Upper Bound for Difference |
| -1.090 | 0.717 | -0.534 |

Test

|  |  |
| --- | --- |
| Null hypothesis | H₀: μ₁ - µ₂ = 0 |
| Alternative hypothesis | H₁: μ₁ - µ₂ < 0 |

|  |  |  |
| --- | --- | --- |
| T-Value | DF | P-Value |
| -3.40 | 18 | 0.002 |



Conclusion

The boxplot clearly shows that the new machine has significantly lower mean that of old machine. the shape of the new machine is symmetrical while the shape of the old machine is slightly left skewed. but the variation of packing time both machine is almost same. Hence two machines are same in terms of process standard deviation but they are different in terms of average processing time.

Since p- value <<α -value =0.05, we strongly reject the null hypothesis that the average packaging time is same and hence conclude that packaging time is significant difference. Comparing average packing of new machine (42.14) and that of new machine (43.23), the new machine is packaging significantly faster than the old machine. hence new machine is superior to old machine