Suppose we have seen that the mean price of the house in a local news article Ames, Iowa is $135,000 and we want to see if this hypothesis is true.

A sample data 300 homes has been collected to perform the statistical test and calculated that the sample mean ($137,525) and standard error ($2,172). So, given this variability in the sample data we try to perform this test called the one-sample t-test to see If the mean of the population and the sample are indeed equal or not?

Here,

data to calculate this.

We calculated from the sample the t-statistic which is 1.16 and we use the p-value to either reject the null hypothesis or fail to reject the null hypothesis. Being a 2-sided test, the rejection region is contained in both tails. If the t value falls in the rejection region then we reject the null hypothesis basing on the confidence level which is traditionally 95% i.e.

I performed the t test in SAS using proc t-test:

*The first table provides descriptive statistics.*

*The second table provides confidence intervals.*

*The last table provides t-test information.*

*If t statistic as shown in the t-test information table below is close to zero and p-value is greater than α evidence suggest the hypothesis parameter is reasonable and we fail to reject the null hypothesis.*

|  | **Mean** | **Std Dev** | **Std Err** | **Minimum** | **Maximum** |
| --- | --- | --- | --- | --- | --- |
| 300 | 137525 | 37622.6 | 2172.1 | 35000.0 | 290000 |

| **Mean** | **95% CL Mean** | | **Std Dev** | **95% CL Std Dev** | |
| --- | --- | --- | --- | --- | --- |
| 137525 | 133250 | 141799 | 37622.6 | 34833.7 | 40900.7 |

| **DF** | **t Value** | **Pr > |t|** |
| --- | --- | --- |
| 299 | 1.16 | 0.2460 |



We can see from the below confidence interval plot that the mean hypothesized value is contained in the confidence interval and we can conclude that the mean housing price is not statistically different from $135,000

To check the validity of the test performed we use the test of normality which can be seen from the normal distribution plot and the Q-Q plot as below which shows that the points are clustered around the 45-degree line.





Suppose now we have two population means instead of a number as in the case above and we want to check if the means of the two populations are equal or not, we perform the 2-sample t test.