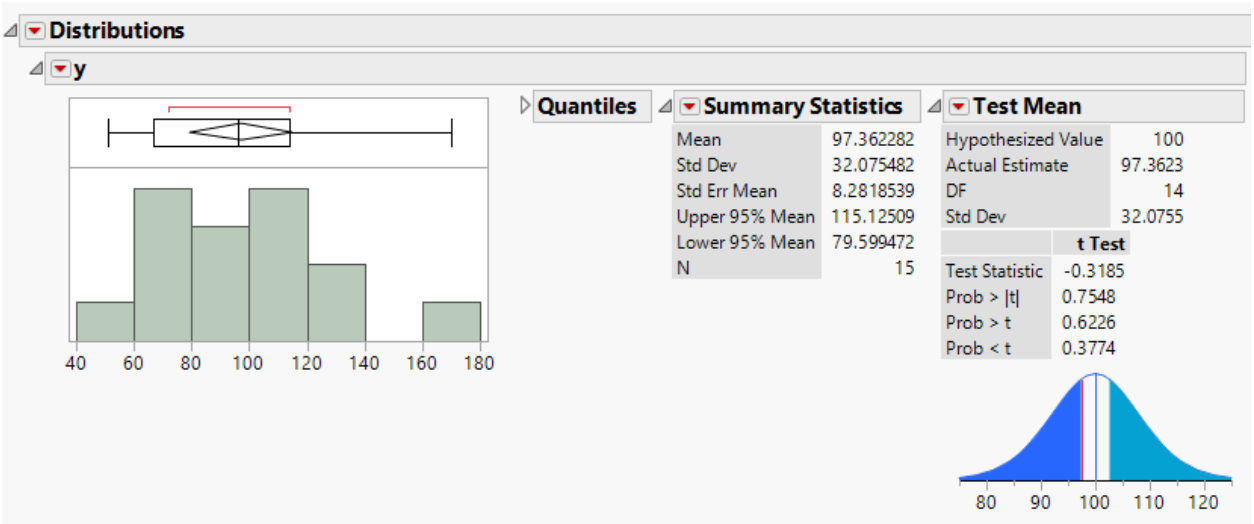
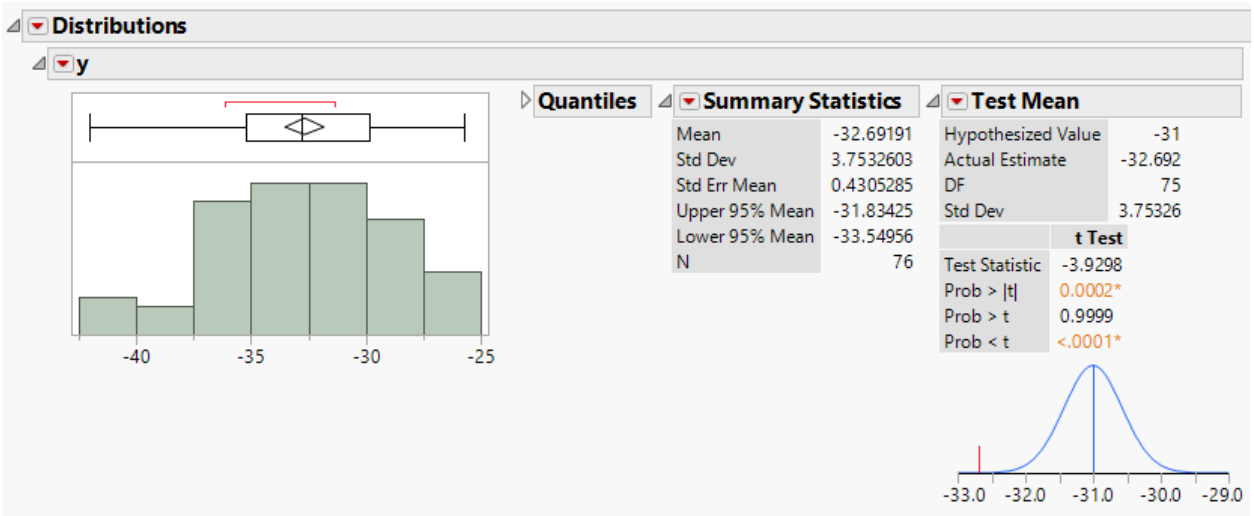
Determine the p-value for the following problems. Draw a conclusion at the significance level $\alpha = 0.1$.

1. $H_0 : \mu = 100$ vs $H_a : \mu < 100$



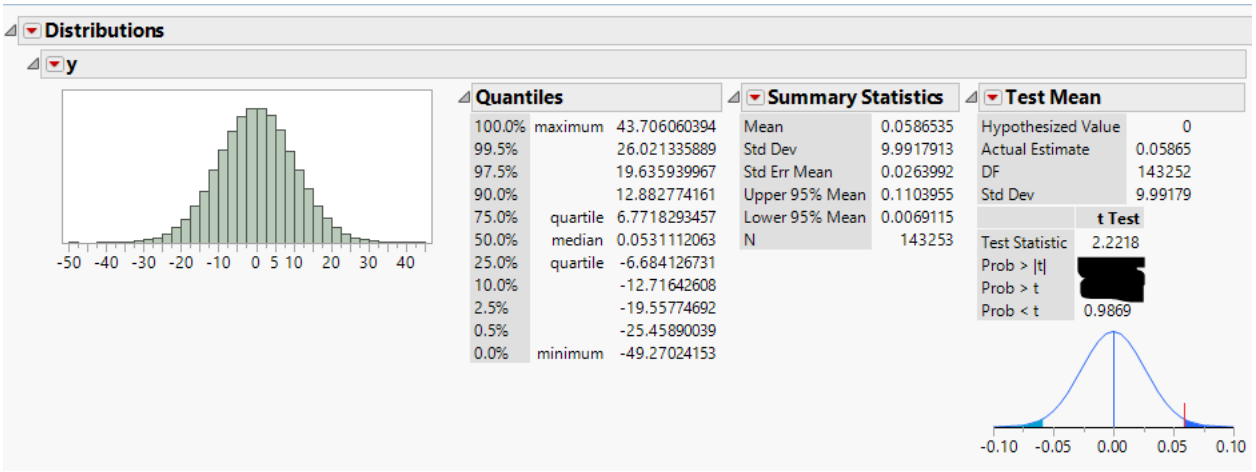
Answer:
The p-value is 0.3774. Since the p-value is greater than our significance level of 0.1, we fail to reject the null hypothesis.

2. $H_0 : \mu = -31$ vs $H_a : \mu > -31$



Answer:
The p-value is 0.9999. Since the p-value is greater than our significance level of 0.1, we fail to reject the null hypothesis.

3. $H_0 : \mu = 0$ vs $H_a : \mu \neq 0$



Answer:

The p-value is $2(1 - 0.9869) = 0.0262$. Since the p-value is less than our significance level of 0.1, we reject the null hypothesis.

4. A clothing companies makes skinny jeans and has a design specification for the elasticity of these jeans set to 57 Pascals (Pa). They would like to know if the mean elasticity is below this specification. The obtain a random sample of 20 skinny jeans and find the mean elasticity is 55.53 Pa and the standard deviation is 4.55. Conduct a hypothesis at significance level $\alpha = 0.1$.

Answer:

Let μ be the mean elasticity of these skinny jeans. We have $H_0 : \mu = 57$ Pa and $H_a : \mu < 57$ Pa. The t-statistic is

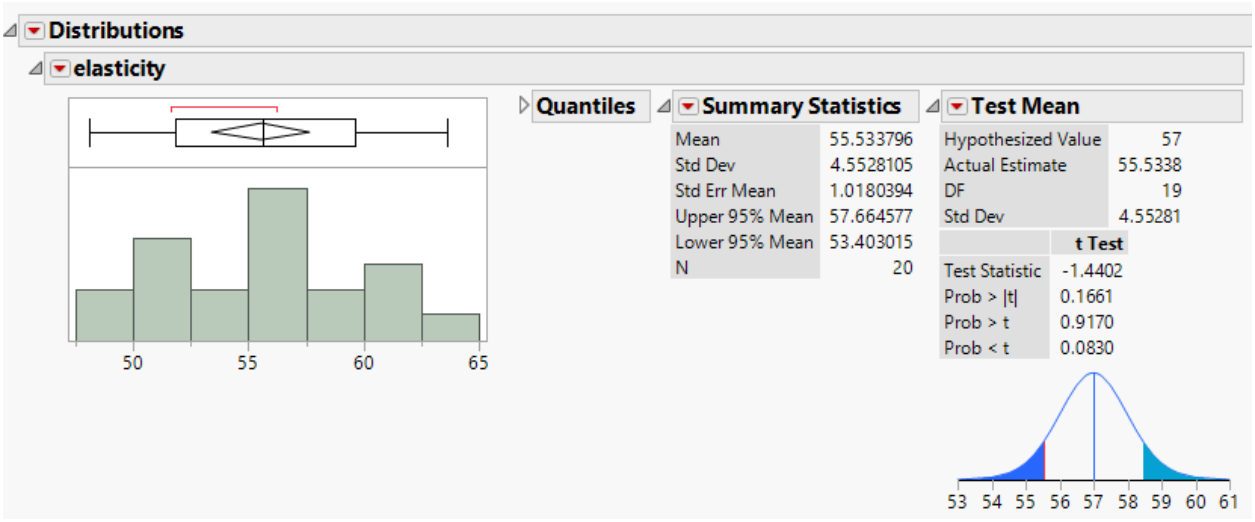
$$t = \frac{55.53 - 57}{4.55/\sqrt{20}} = -1.445.$$

The probability is not available directly on our t-table, but we can determine that

$$0.05 < P(T_{19} < -1.445) < 0.10.$$

Thus our p-value is less than our significance level of 0.1 and therefore we reject the null hypothesis that mean elasticity of these skinny jeans is 57 Pa.

5. Verify your answers above using the JMP output below.



Answer:

Up to rounding error, the t-statistic value of -1.4402 is the same as what we got in the previous problem and the p-value is 0.0830 which is between 0.05 and 0.10.