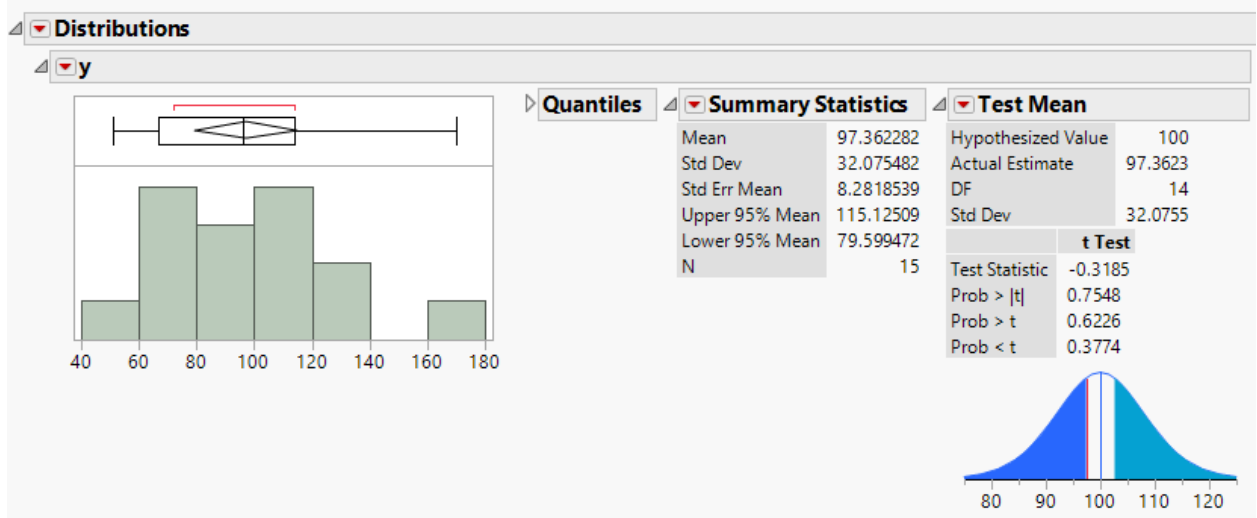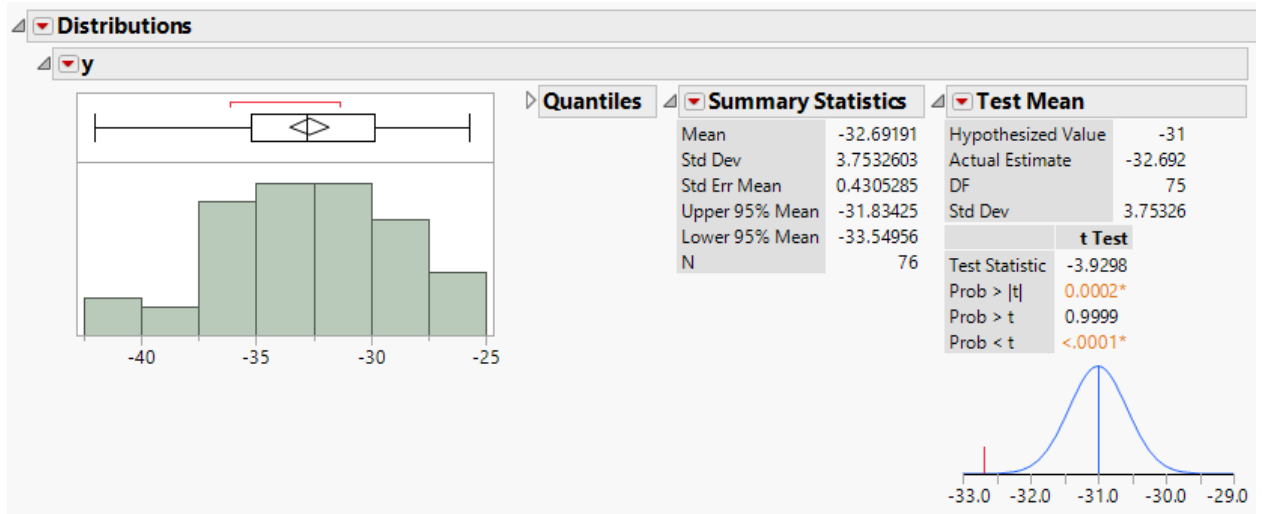Determine the p-value for the following problems. Draw a conclusion at the significance level $\alpha = 0.1$.
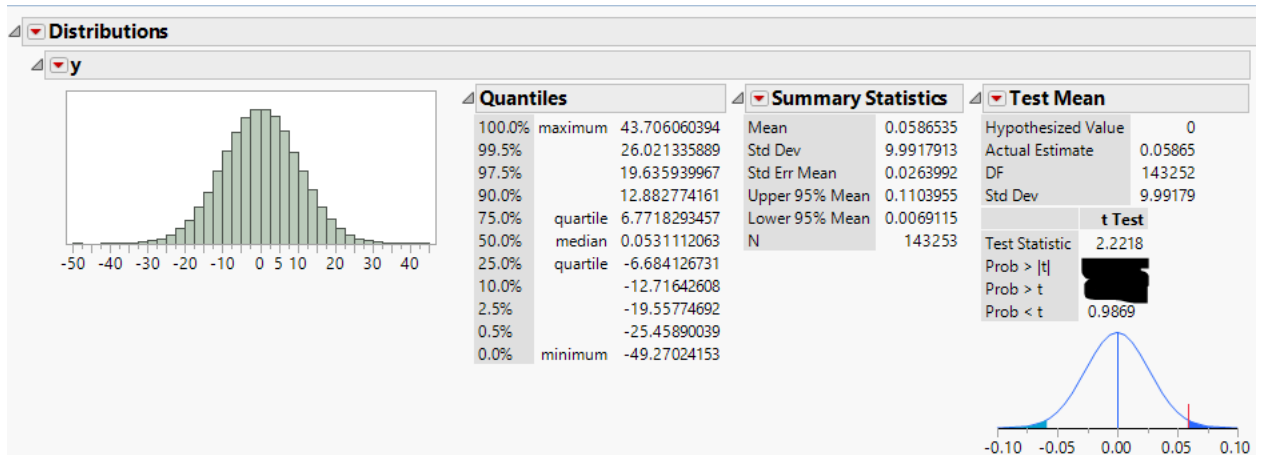
1. $H_0 : \mu = 100$ vs $H_a : \mu < 100$

Distributions

y

Quantiles	Summary Statistics		Test Mean	
	Mean	97.362282	Hypothesized Value	100
	Std Dev	32.075482	Actual Estimate	97.3623
	Std Err Mean	8.2818539	DF	14
	Upper 95% Mean	115.12509	Std Dev	32.0755
	Lower 95% Mean	79.599472	**t Test**	
	N	15	Test Statistic	-0.3185
			Prob > |t|	0.7548
			Prob > t	0.6226
			Prob < t	0.3774

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

Distributions

y

Quantiles	Summary Statistics		Test Mean	
	Mean	-32.69191	Hypothesized Value	-31
	Std Dev	3.7532603	Actual Estimate	-32.692
	Std Err Mean	0.4305285	DF	75
	Upper 95% Mean	-31.83425	Std Dev	3.75326
	Lower 95% Mean	-33.54956	**t Test**	
	N	76	Test Statistic	-3.9298
			Prob > |t|	0.0002*
			Prob > t	0.9999
			Prob < t	<.0001*

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

Distributions

y

Quantiles			Summary Statistics		Test Mean	
100.0%	maximum	43.706060394	Mean	0.0586535	Hypothesized Value	0
99.5%		26.021335889	Std Dev	9.9917913	Actual Estimate	0.05865
97.5%		19.635939967	Std Err Mean	0.0263992	DF	143252
90.0%		12.882774161	Upper 95% Mean	0.1103955	Std Dev	9.99179
75.0%	quartile	6.7718293457	Lower 95% Mean	0.0069115	**t Test**	
50.0%	median	0.0531112063	N	143253	Test Statistic	2.2218
25.0%	quartile	-6.684126731			Prob > |t|	
10.0%		-12.71642608			Prob > t	
2.5%		-19.55774692			Prob < t	0.9869
0.5%		-25.45890039				
0.0%	minimum	-49.27024153				

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 $\alpha = 0.1$.

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