

Example problem:

The shelf life of a carbonated beverage is of interest. Ten bottles are randomly selected and tested, and the following results obtained. Days since bottling: 108,124,124,106,115,138,163,159,134,139.

Can we accept the claim that the mean shelf life is greater than or equal to 130 days?

Step #1: State the Null Hypothesis

$$H_0 : \mu \geq 130 \text{ days}$$

$$H_1 : \mu < 130 \text{ days}$$

Step #2: State the assumptions

Normal Distribution, Random Sampling

Step #3: Set the alpha risk

$$\alpha = 0.05 \text{ with degrees of freedom} = 10 - 1 = 9, \text{ One tailed test}$$

Step #4: Determine the critical regions

Reject the Null Hypothesis that the average bottle life is ≥ 130 days if the calculated the calculated t value is less than -2.262 .

t distribution table

Degrees of Freedom	Probabilities					
	0.2	0.1	0.05	0.025	0.01	0.005
1	3.078	6.314	12.706	25.452	63.656	127.321
2	1.886	2.920	4.303	6.205	9.925	14.089
3	1.638	2.353	3.182	4.177	5.841	7.453
4	1.533	2.132	2.776	3.495	4.604	5.598
5	1.476	2.015	2.571	3.163	4.032	4.773
6	1.440	1.943	2.447	2.969	3.707	4.317
7	1.415	1.895	2.365	2.841	3.499	4.029
8	1.397	1.860	2.306	2.752	3.355	3.833
9	1.383	1.833	2.262	2.685	3.250	3.690
10	1.372	1.812	2.228	2.634	3.169	3.581
11	1.363	1.796	2.201	2.593	3.106	3.497
12	1.356	1.782	2.179	2.560	3.055	3.428
13	1.350	1.771	2.160	2.533	3.012	3.372
14	1.345	1.761	2.145	2.510	2.977	3.326
15	1.341	1.753	2.131	2.490	2.947	3.286
10000	1.282	1.645	1.960	2.242	2.576	2.808

Step #5: Calculate the test statistic

$$t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$$

t-statistic = (131- 130)/6.1806 = 0.1618

Carbonated Beverage

		<i>Carbonated Beverage</i>	
108			
124	Mean		131
124	Standard Error	6.180614856	
106	Median		129
115	Mode		124
138	Standard Deviation	19.54482029	
163	Sample Variance		382
159	Kurtosis	-0.73380566	
134	Skewness	0.4283795	
139	Range		57
	Minimum		106
	Maximum		163
	Sum		1310
	Count		10

Step #6: Accept or Reject the Null Hypothesis

Since the t-statistic 0.1618 is greater than -2.262 then we cannot reject the null hypothesis that the life is greater than or equal to 130 days.

Step#7: Translate into English

No statistical proof that the average shelf life is less than 130 days.