

Practical No. 1 : One sample t test for mean

A company manufactures a metal ring for industrial engines that usually weigh about 50 ounces. A random sample of 50 of these metal rings produced the following weights (in ounces).

51	53	56	50	44	47	53	53	42	57
46	55	41	44	52	56	50	57	44	46
41	52	69	53	57	51	54	63	42	47
47	52	53	46	36	58	51	38	49	50
39	44	55	43	52	43	42	57	49	51

Enter this data in Minitab and generate the following reports:

Questions :

- (a) Is the data normally distributed, which required for the test?
- (b) Test the null hypothesis that population mean weight of ring is 50 ounces against not. Take significance level as 5%.

Solution :

Step 1 : Type your data into the data pane of a worksheet. Make sure you put your data into columns. Use column header for "Weight of ring". Type the "Weight of ring" data into column C1.

Step 2 : To perform one sample t test for mean, under the drop-down menu "Stat", choose "Basic Statistics" then "1-Sample t...". A "One-Sample t for the Mean" dialogue box will appear.

Step 3 : Under the drop-down menu, choose "One or more samples, each in a column". In the box below, choose "C1 Weight of Ring" from the table on the left. Check the "Perform hypothesis test" checkbox and set the "Hypothesized mean" as 50.

Step 4 : Click the "Options..." option. A "One-Sample t: Options" dialogue box will appear. Set the "Confidence level" as 95.0 and "Alternative hypothesis" drop-down menu as "Mean \neq hypothesized mean" and click "OK".

Step 5 : Click the "Graphs..." option. A "One-Sample t: Graphs" dialogue box will appear. Check the "Histogram" and "Boxplot" checkboxes and click "OK". Click "OK" again. The following descriptive statistics, test, histogram, and box plot will be generated.

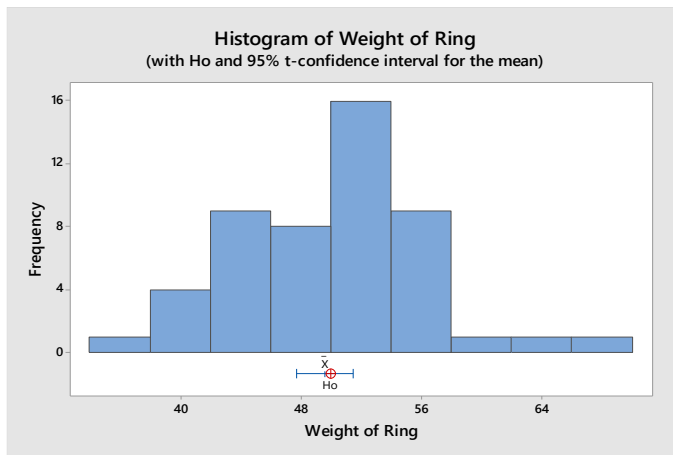


Fig 1 : Histogram of weight of ring

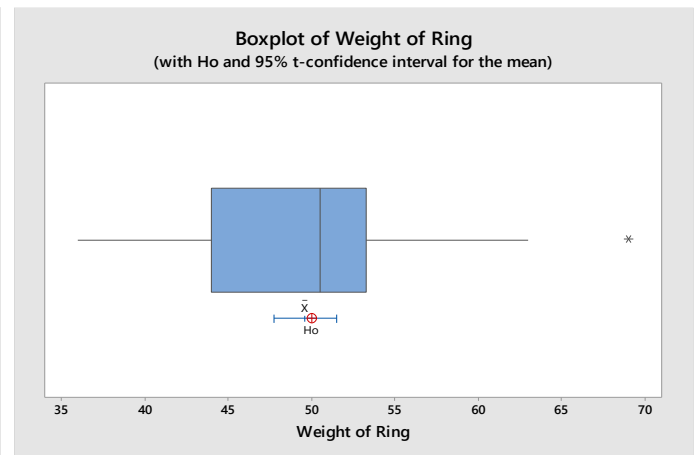


Fig 2 : Box-and-whisker plot of weight of ring

Interpretation :

The box-and-whisker plot and histogram shows that the distribution of weight of metal ring is left skewed. The data is approximately normally distributed which meets one of the fundamental assumptions of t test for mean. The normality assumption of data for the test is not seriously violated.

Descriptive Statistics :

N	Mean	StDev	SE Mean	95% CI for μ
50	49.620	6.577	0.930	(47.751, 51.489)

μ : population mean of Weight of Ring

Interpretation :

The 95 % confidence interval for mean weight of metal ring is between 47.75 and 51.49 ounce. It shows that the distribution is very slightly shifted to left of mean value of 50 ounces. The shift is not significant.

Hypothesis :

Null hypothesis	$H_0 : \mu = 50$
Alternative hypothesis	$H_1 : \mu \neq 50$

Test :

T-Value	P-Value
-0.41	0.685

Conclusion :

Since p-value (0.685) is greater than the significance probability (0.05), we accept null hypothesis H_0 at 5 % level of significance. It means that mean weight of metal ring produced by the machine is not significantly different from specified mean that is 50 ounces.

Worksheet :

↓	C1	C2	C3	C4
	Weight of Ring			
1	51			
2	46			
3	41			
4	47			
5	39			
6	53			
7	55			
8	52			
9	52			
10	44			
11	56			
12	41			
13	69			
14	53			
15	55			
16	50			
17	44			
18	53			
19	46			
20	43			
21	44			
22	52			
23	57			
24	36			
25	52			
26	47			
27	56			
28	51			
29	58			
30	43			
31	53			
32	50			
33	54			
34	51			
35	42			
36	53			
37	57			
38	63			
39	38			
40	57			
41	42			
42	44			
43	42			
44	49			
45	49			
46	57			
47	46			
48	47			
49	50			
50	51			
51				
52				
53				
54				