

Problem 2

Note Title

10/31/2008

2. Answer the following questions regarding the study in Exercise 5.55, and report your findings. (Data file ex5-55.csv)
- (a) Present a short description of the study and the data, including summary statistics for each variable.

A consumer testing agency wants to determine the average number of miles that can be obtained tires of a manufacturer. The agency randomly selected 60 tires from the manufacturer's warehouse and placed the tires on 15 cars driven by test drivers on a 2-mile oval track.

Variable:

Miles: The number of miles driven (in thousands of miles) until the tires are determined to be worn out.

Variable	Mean	S.D	L.Quartile	Median	U.Quartile
Miles	31.46667	5.040786	28	30	34

(b) The manufacturer claims that their tires can be driven at least 35,000 miles before wearing out. Is there significant evidence that the manufacturer's claim is false? Construct the null and the alternative hypothesis for the test.

μ = mean lifetime of tires (in thousand miles)

Agency's claim: $\mu < 35$

↓

Null: $H_0: \mu \geq 35$

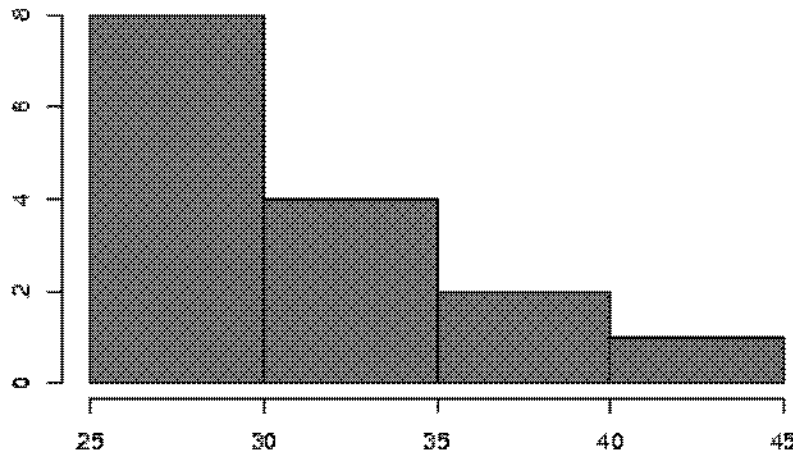
↓

reject H_0 .

↓

Alternative: $H_A: \mu < 35$

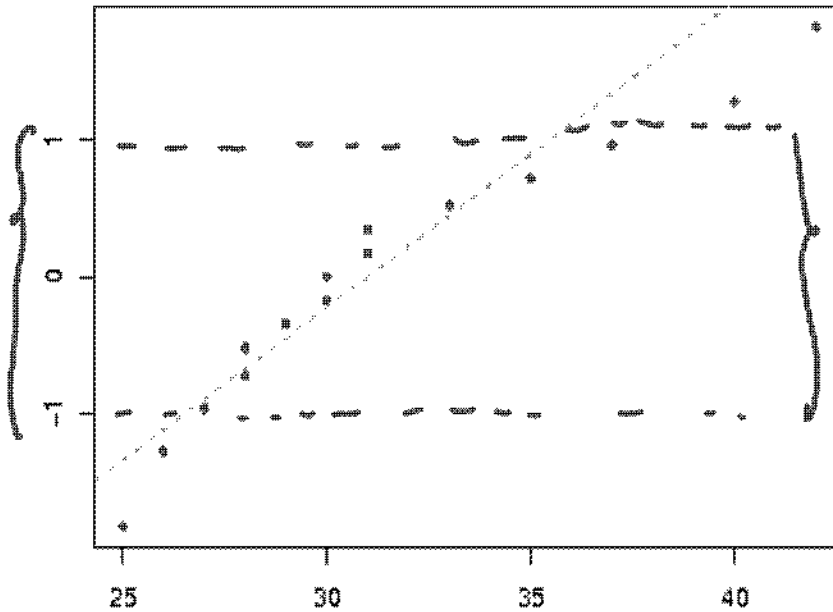
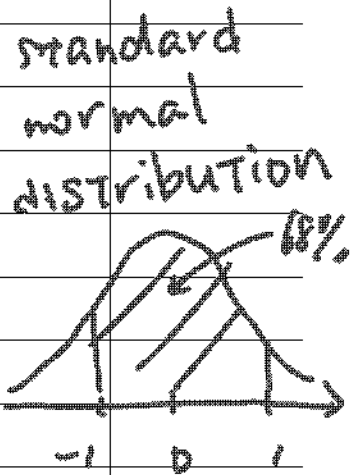
(c) Construct a QQ normal plot, and assess the normality of the sample distribution.



Skewed to the right.



Data do not follow normal



68% of data

Miles in thousands

(d) Calculate the test statistic and the p-value of the test.

t-statistic	p-value
-2.71476	0.008382

(e) Given the significance level 0.01, interpret your findings.

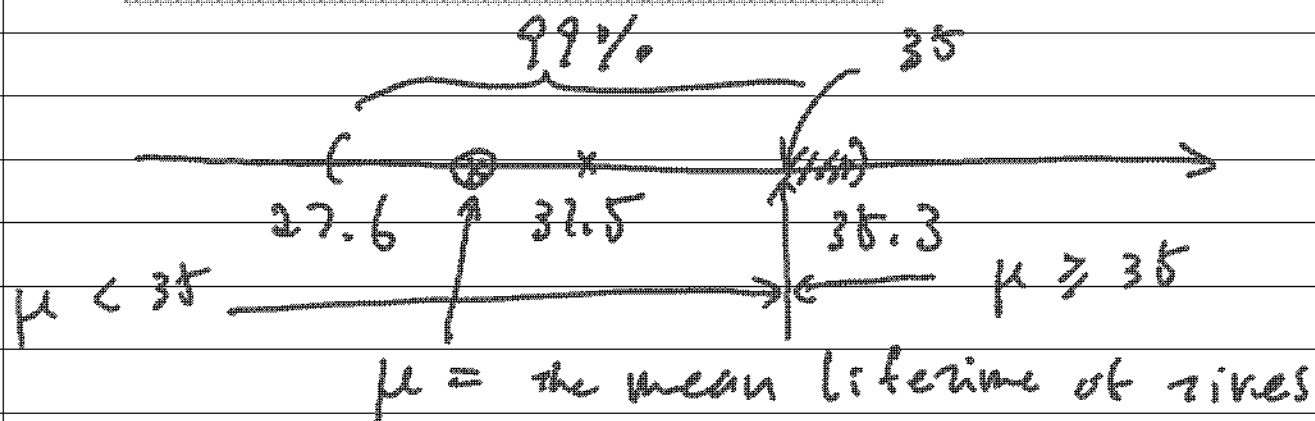
There is evidence to support the agency's claim: The lifetime of tires is less than 35,000 miles.

Interpretation of the result and confidence interval

There is an interesting relationship between confidence intervals (CI's) and hypothesis tests: If the null hypothesis is rejected with significance level then the corresponding CI does not contain the null value.

(f) Construct a 99% confidence interval.

C.I.	L.Bound	U.Bound
99%	27.59223	35.34111



(g) Is there a contradiction between the confidence interval and your interpretation of the test? If so, what do you resolve such a contradiction and how do you explain it in the report?

The C.I. in (f) indicates the possibility that $\mu \geq 35$.

C.I.	L.Bound	U.Bound
99%	27.59223	35.34111
95%	28.67518	34.25816
99% Negative Inf		34.88252

← It introduces a contradiction

← Instead use a smaller confidence level

← Use one-sided confidence interval.

They are possible resolutions.

Significance of the result

Result:

① Reject $H_0 \Rightarrow$ Find evidence to support the claim

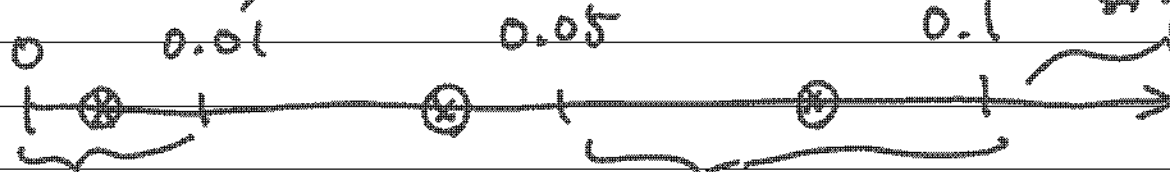
\uparrow The result is significant

② Do not reject $H_0 \Rightarrow$ Find no evidence

\uparrow The result is not significant

P-value The result is significant

The result is not significant.



The result is highly significant

The result is not significant
It indicates some evidence

It indicates no evidence