

Chapter2_Ex4_page17

Exercise 4:

For the following data:

8.1	8.2	8.2	8.7	8.7	8.8	8.8	8.9	8.9	8.9
9.2	9.2	9.2	9.3	9.3	9.3	9.4	9.4	9.4	9.4
9.5	9.5	9.5	9.5	9.6	9.6	9.6	9.7	9.7	9.9

(a) Find: Skewness, Standard error of the skewness, Kurtosis, Standard error of the kurtosis

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2 library(e1071)
3 #dataset:
4 y=c(8.1,9.2,9.5,8.2,9.2,9.5,8.2,9.2,9.5,8.7,9.3,9.5,8.7,9.3,9.6,8.8,9.3,9.6
5      ,8.8,9.4,9.6,8.9,9.4,9.7,8.9,9.4,9.7,8.9,9.4,9.9)
6 #sample mean of y:
7 m=mean(y)
8 m
9 #sample standard deviation of y :
10 sD=sd(y)
11 sD
12 #size of y :
13 n=length(y)
14 #Sample Skewness:
15 SK=skewness(y, type=2)
16 SK
17 #Standard error of the skewness
18 SE_SK=sqrt( (6*n*(n-1)) / ((n-2)*(n+1)*(n+3)) )
19 SE_SK
20 #Z-score of the skewness
21 Z_score_SK=SK/SE_SK
22 #Sample Kurtosis:
23 K=kurtosis(y,type=2)
24 K
25 #Standard error of the kurtosis
26 SE_K=sqrt( (24*n*(n-1)^2) / ((n-2)*(n-3)*(n+5)*(n+3)) )
27 SE_K
28 #Z-score of the Kurtosis
29 Z_score_k=K/SE_K
30 #Z table :
31 Z_table=qnorm(1-0.05/2)
32

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R Global Environment	
Values	
K	0.187758246645332
m	9.18
n	30L
sD	0.466387436987008
SE_K	0.832745618357633
SE_SK	0.426892395951238
SK	-0.904378826787758
y	num [1:30] 8.1 9.2 9.5 8.2 9.2 ...
Z_score_k	0.225468909720156
Z_score_SK	-2.11851706745102
Z_table	1.95996398454005

Standard
error (SE)

$$SE_{S_k} = \sqrt{\frac{6n(n-1)}{(n-2)(n+1)(n+3)}}$$

$$SE_K = \sqrt{\frac{24n(n-1)^2}{(n-2)(n-3)(n+5)(n+3)}}$$

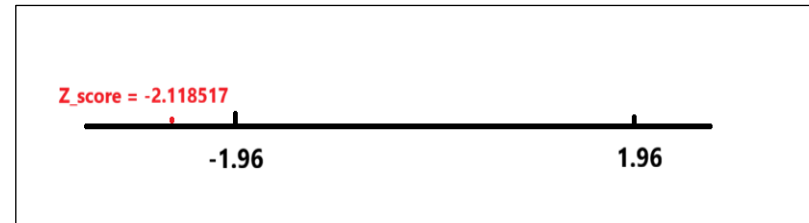
Skewness

Skewness= -0.9043788

Standard error of the skewness= 0.4268924

Z_score = -2.118517

Z_score $\notin (-1.96, 1.96)$ fail the normality assumption for $\alpha = 0.05$



Kurtosis

Kurtosis= 0.1877582

Standard error of the kurtosis= 0.8327456

Z_score = 0.2254689

Z_score $\in (-1.96, 1.96)$ pass the normality assumption for $\alpha = 0.05$

