

length in inches 2.54

conversion (cm)

0.4
0.33
1.37
0.68
0.61
0.06
1.76
0.75
1.91
0.72
0.79
1.28
0.6
0.14
0.02
1.2
1.37
0.27
1.27
1.01
0.22
0.72
1.37
0.22
0.52
0.09
1.7
0.83
0.25
1.41
0.23
0.14

count
average
max
min
modus
median
variance (population)
variance (sample)
stand. dev. (population)
stand. dev. (sample)

0.9 percentile
0.5 percentile
0.1 percentile

Drivers paid in a certain town 12 penalties in a week [EUR]:

1320	1500	200	1750	820	1000	900	400	4500
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Evaluate by descriptive statistics, i.e.:

- calculate mean, variance and standard deviation
- calculate upper and lower quartile, interquartile range and median;
- draw a box-and-whisker plot
- divide the data into classes and make a histogram

penalties

1320

1500

200

1750

820

3100	180	120
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Gaussian function

function =normsdist

=NORM.S.DIST(z;cum

function =normdist

=NORM.DIST(z;x0;s;0

x	x0=0 s=1	
	P(x)	CDF(x)
-4.0	0.000	0.000
-3.5	0.000	0.001
-3.0	0.001	0.004
-2.5	0.006	0.018
-2.0	0.023	0.054
-1.5	0.067	0.130
-1.0	0.159	0.242
-0.5	0.309	0.352
0.0	0.500	0.399
0.5	0.691	0.352
1.0	0.841	0.242
1.5	0.933	0.130
2.0	0.977	0.054
2.5	0.994	0.018
3.0	0.999	0.004
3.5	1.000	0.001
4.0	1.000	0.000

ul)
/1)

From a table you obtained by rolling a 6-sided die find out, if the die is fair (N=36).
 Use chi-2 test with the usual significance level.

#	observed	expected	o(i)-e(i)	(o(i)-e(i))^2/e(i)
1	11	6	5	4.166666667
2	5	6	-1	0.166666667
3	9	6	3	1.5
4	2	6	-4	2.666666667
5	7	6	1	0.166666667
6	2	6	-4	2.666666667

36

sum:

11.33333333

$$\chi^2 = \sum_{i=1}^k$$

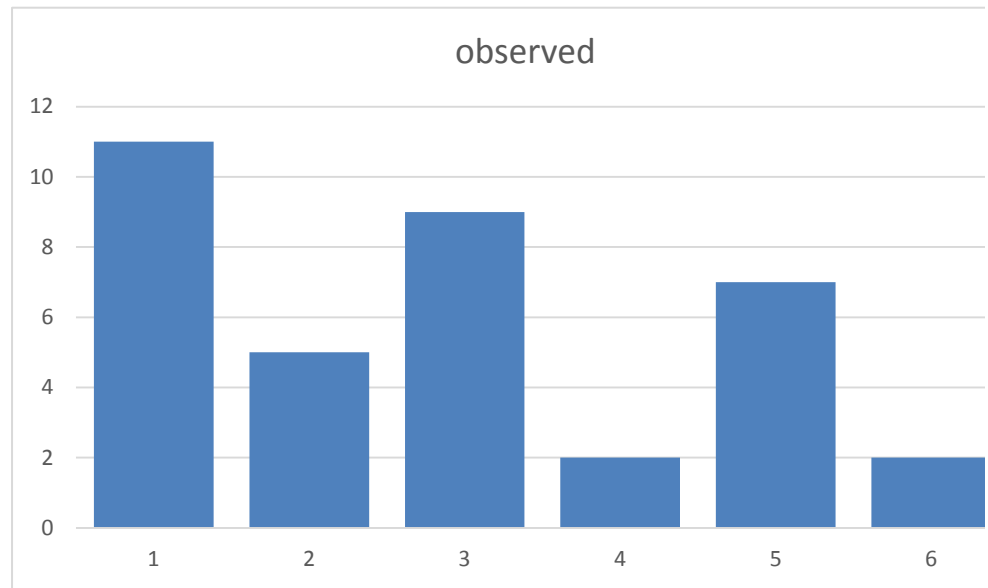
Null Hypothesis: Outcomes have equal propability - The dice is fair.

Alternative Hypothesis: Outcomes don't have equal propability - The dice is not fair.

Conclusion: According to the values we got,



$$\frac{(O_i - E_i)^2}{E_i}$$



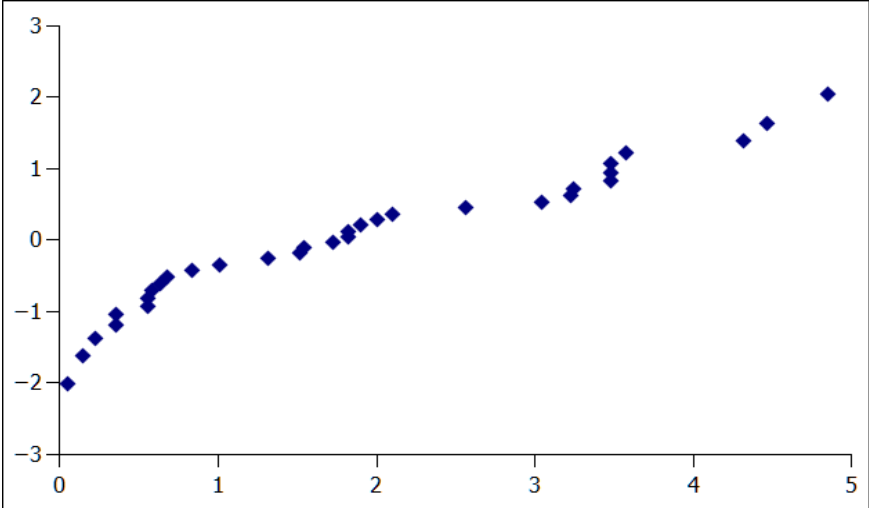
we reject the null hypothesis which means that this dice is not fair, there is not equal probability for each side



3 of the dice.

normality

gnumeric
Fagus sylvatica



find outlier with the method of inner fences!

No.	concentration of Pb [ng/ml]
1	37.9
2	22.8
3	13.4
4	31.6
5	50.8
6	20.2
7	9.5
8	26.7
9	76.1
10	22.0

- Lower inner fence: $Q_1 - 1.5(IQR)$
- Upper inner fence: $Q_3 + 1.5(IQR)$
- Lower outer fence: $Q_1 - 3(IQR)$
- upper outer fence: $Q_3 + 3(IQR)$

$$1 - (1.5 * IQR)$$

$$3 + (1.5 * IQR)$$

$$1 - (3 * IQR)$$

$$3 + (3 * IQR)$$

find an outlier by Grubbs' test

# experiment	concentration of Pb [ng/ml]
1	37.9
2	22.8
3	13.4
4	31.6
5	50.8
6	20.2
7	9.5
8	26.7
9	76.1
10	22.0

n	G_{crit} $\alpha=0.05$	n	G_{crit} $\alpha=0.05$	n	G_{crit} $\alpha=0.05$
3	1.1543	15	2.5483	80	3.1
4	1.4812	16	2.5857	90	3.1
5	1.7150	17	2.6200	100	3.1
6	1.8871	18	2.6516	120	3.1
7	2.0200	19	2.6809	140	3.1
8	2.1266	20	2.7082	160	3.1
9	2.2150	25	2.8217	180	3.1
10	2.2900	30	2.9085	200	3.1
11	2.3547	40	3.0361	300	3.1
12	2.4116	50	3.1282	400	3.1
13	2.4620	60	3.1997	500	3.1
14	2.5073	70	3.2576	600	3.1

crit
=0.05

3061

3477

3841

4451

4951

5373

5736

6055

7236

8032

8631

9109