

Average

The average is the sum of observations divided by the number of observations

Median

Median has 50% of data above, 50% at or below

Root-Mean Square (r.m.s.)

1. Square every entry
2. Take the average of the squares
3. Take the square root of the average

Standard Deviation

Deviation from average = entry – average

SD = r.m.s. deviation from average

1. Calculate the average
2. Calculate individual deviations from average
3. Calculate r.m.s. of deviations

Standard Deviation for a list with only 2 different numbers

$$\left(\frac{\text{big}}{\text{number}} - \frac{\text{small}}{\text{number}} \right) \times \sqrt{\frac{\text{fraction with big number}}{\text{big number}} \times \frac{\text{fraction with small number}}{\text{small number}}}$$

Standard Units

$$\text{value in standard units} = \frac{\text{value} - \text{average}}{\text{SD}}$$

Chances

The chances that two things will both happen equals the chance that the first will happen, multiplied by the chance that the second will happen given the first has happened

Expected Value of the Sum

$$(\text{number of draws}) \times (\text{average of box})$$

Standard Error of the Sum

$$\sqrt{\text{number of draws}} \times (\text{SD of box})$$

Confidence Intervals

$$\text{sample average} \pm z \times \text{SE}$$

Z test statistic

$$z = \frac{\text{observed} - \text{expected}}{\text{SE}}$$

Standard error for the difference

If the two quantities are independent, the SE is

$$\sqrt{a^2 + b^2}$$

Where a is the SE for the first quantity and b is the SE for the second quantity.

Standard Deviation in Small Samples

For use when the list of numbers (n) is small:

$$\text{SD}^+ = \sqrt{\frac{n}{n-1}} \times \text{SD}$$

Degrees of Freedom for t-test

$$df = n - 1$$

Chi-square test statistic

$$\chi^2 = \text{sum of } \frac{(\text{observed frequency} - \text{expected frequency})^2}{\text{expected frequency}}$$

Degrees of Freedom for chi-square test of independence

For a table with m rows and n columns

$$df = (m - 1) \times (n - 1)$$

The t-test

Here's a short t-table

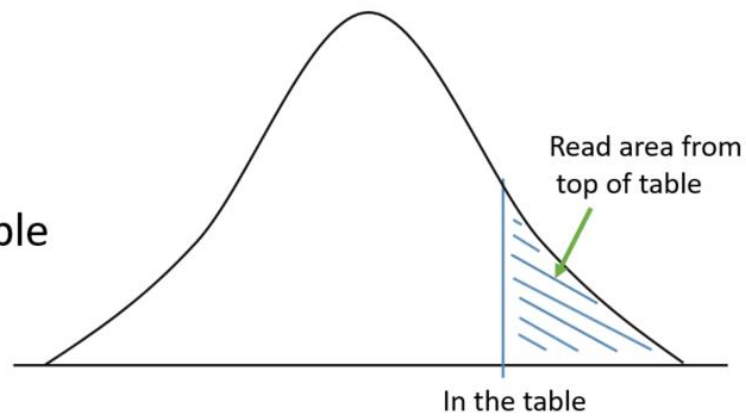


Table 1. A short *t*-table.

<i>Degrees of freedom</i>	10%	5%	1%
1	3.08	6.31	31.82
2	1.89	2.92	6.96
3	1.64	2.35	4.54
4	1.53	2.13	3.75
5	1.48	2.02	3.36

Table 3. A short χ^2 table extracted from the bigger one on p. A106.

<i>Degrees of freedom</i>	90%	50%	10%	5%	1%
1	0.016	0.46	2.71	3.84	6.64
2	0.21	1.39	4.60	5.99	9.21
3	0.58	2.37	6.25	7.82	11.34
4	1.06	3.36	7.78	9.49	13.28
5	1.61	4.35	9.24	11.07	15.09
6	2.20	5.35	10.65	12.59	16.81
7	2.83	6.35	12.02	14.07	18.48
8	3.49	7.34	13.36	15.51	20.09
9	4.17	8.34	14.68	16.92	21.67
10	4.86	9.34	15.99	18.31	23.21