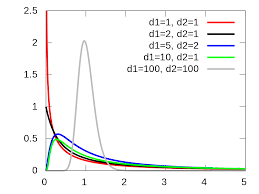
**https://www.toppr.com/guides/maths-formulas/t-test-formula/**

**What is the T-test?**

There are many types of t-test. Some of these are:

* The one-sample t-test, which is used to compare the mean of a population with a theoretical value.
* The unpaired two-sample t-test, which is used to compare the mean of two independent given samples.
* The paired t-test, which is used to compare the means between two groups of samples that are related.

**T-test Formula**

The T-test formula is given below:

**t =**x1¯−x2¯(√s21n1+s22n2)

Where,

|  |  |
| --- | --- |
| t | t-test value |
| x1¯ | Mean of first set of values |
| x2¯ | Mean of second set of values |
| s1 | Standard deviation of first set of values |
| s2 | Standard deviation of second set of values |
| n1 | Total number of values in first set |
| n2 | Total number of values in second set. |

Also,

The formula for [standard deviation](https://www.toppr.com/guides/economics/measures-of-dispersion/standard-deviation/) is given below:

s=(√∑(x−x¯)2n−1)

Where,

|  |  |
| --- | --- |
| s | The standard deviation for a data set |
| x | Values given in data set |
| x¯ | Mean value of data set |
| n | Total number of values in the data set |

**Solved Examplesa+6**

Q.1: Find the t-test value for the following given two sets of values:

7, 2, 9, 8 and

1, 2, 3, 4?

Solution: For first data set:

Number of terms in first set i.e. n\_1 = 4

Calculate mean value for first data set using formula:

x¯1=∑x1n1

i.e. x¯1=7+2+9+84

i.e. x¯1=6.5

Construct the following table for standard deviation:

|  |  |  |
| --- | --- | --- |
| x1 | x1−x¯1 | (x1−x¯1)2 |
| 7 | 0.5 | 0.25 |
| 2 | -4.5 | 20.25 |
| 9 | 2.5 | 6.25 |
| 8 | 1.5 | 2.25 |

Thus ,  ∑((x1−x¯1)2)=29

Now,  compute the standard deviation usng formula as,

s1=(√∑(x1−x¯1)2n1−1)

i.e. s1=(√294−1)

i.e. s1=(√9.66)

s1=3.11

Therefore, standard deviation for the first set of data: s\_1 = 3.11

For second data set:

Number of terms in second set i.e. n2=4

Calculate mean value for second data set using formula:

x¯2=∑x2n2

i.e. x¯2=1+2+3+44

i.e. x¯2=2.5

Construct the following table for standard deviation:

|  |  |  |
| --- | --- | --- |
| x2 | x2−x¯2 | (x2−x¯2)2 |
| 1 | -1.5 | 2.25 |
| 2 | -0.5 | 0.25 |
| 3 | 0.5 | 0.25 |
| 4 | 1.5 | 2.25 |

Thus, ∑((x2−x¯2)2)=5

Now, compute the standard deviation using formula as,

s2=(√∑(x2−x¯2)2n2−1)

i.e. s2=(√54−1)

i.e. s1=(√1.66)

s1=1.29

Therefore, standard deviation for the second set of data: s2=1.29

Now, apply the formula for t-test value:

t=x1¯−x2¯(√s21n1+s22n2)

t=6.5–2.5(√3.1124+1.2924)

=4(√9.36674+1.6674)

t = 2.38

Hence t-test value for the two data sets is = 2.38

Thus, the t-statistic measures how many standard errors the coefficient is away from zero. Generally, any t-value greater than +2 or less than - 2 is acceptable. The higher the t-value, the greater the confidence we have in the coefficient as a predictor.