

Test of Two Population Means (Paired and Independent)

1. The marks of the “Economics” exam of students who are studying in group A are examined. In order to increase the success of the students, homework is given to each student and after the second exam the marks are observed again and the following results are obtained. Do you think that the homework had a positive impact on the success of the students? (5% significance level)

Before	30	30	20	40	43	58	60	62	70	80
After	35	30	25	38	40	60	63	58	72	85

2. A group of secretaries composed of 8 people were subjected to a new training course and their before and after course performances are measured by the number of typing errors per page and the following results are obtained. Do you believe at a 5% significance level that the course had a positive impact on secretaries’ performances.

Before Course	After Course
4	3
2	4
6	5
3	4
7	6
4	2
2	2
4	2

3. 15 women and 15 men working in a factory were chosen randomly in order to examine if there is any difference between their productivity levels at 1%. Assuming that the variances are equal, the productivity of female workers was 25 thousand TL with a 2.5 thousand TL standard deviation and the productivity of male workers was 26.2 thousand TL with a 3 thousand standard deviation.
4. A TV producer buys electronic tubes from 2 different manufacturers (A and B). 9 tubes from manufacturer A and 12 tubes from manufacturer B are chosen randomly in order to test if there is any difference between the average lifetime of the tubes of A and B. The sample tubes from A are found to last for 500 hours with a standard deviation of 60 and the sample tubes from B last for 532 hours with a standard deviation of 70. Do you think there is a significant difference between the mean lifetime levels of the tubes at a 1% significant level. (Assume that the population standard deviations are unknown but equal.)
5. A producer examines the daily production quantities of 2 operators for a 10 period of time in order to find out if there any difference between the operators and obtained the following results. At a 5% significance level could it be said that there is no difference between the daily production quantities of the two operators? (Assume that population variances are equal)

Operator1	Operator2
$n_1 = 10$	$n_2 = 10$
$\bar{x}_1 = 40$	$\bar{x}_2 = 36$
$s_1 = 5,4$	$s_2 = 4,6$

6. In order to examine the levels of salaries of two different sectors A and B, 33 employees are chosen randomly, (18 and 15 respectively). The average salary in the first sample of 18 employees is 175 euro with a standard deviation of 25 euro and the average salary in the second sample of 15 employees is 163 euro with a standard deviation of 20 euro. Assuming that the two population distributions are normal with the same variance, test if the salaries in the first sector are higher than in the second sector at a 5% significant level.
7. A manager that manages two factories is curious about the average lifetime of the products produced in his factories. In order to determine if there is any difference between the factories according to their products’ average lifetimes, 300 products are chosen randomly from each of the two factories. (Variances are equal)

$\bar{x}_1 = 1510$ hours	$s_1 = 75$ hours
$\bar{x}_2 = 1490$ hours	$s_2 = 90$ hours

8. A chemist working in a candy factory makes 2 different mixes. In order to examine the weights of the 2 mixes same cups are used and the following results are obtained. Assuming that the two population distributions are normal with the same variance, test if there is any significant difference between the weights of the mixes at a 1% significant level.

$n_1 = 12$	$\bar{x}_1 = 140$ gr	$s_1 = 6$ gr
$n_2 = 15$	$\bar{x}_2 = 124$ gr	$s_2 = 5$ gr