Lab no. 12(Wilcoxon sign rank test)

The performance score of students before and after training is given below:

before	44	48	70	65	35	55	48	52	65
after	43	52	73	62	39	54	56	53	67

At 5% level of significance test whether training is beneficial or not.

Hypothesis

Null hypothesis: Md1=Md2 i.e. training isn't beneficial
Alternative hypothesis: Md2>Md2 i.e. training is beneficial.

Level of significance

Alpha= 5%

Test statistics:

Ranks

		N	Mean Rank	Sum of Ranks
after - before	Negative Ranks	3[a]	3.17	9.50
	Positive Ranks	6[b]	5.92	35.50
	Ties	0[c]		
	Total	9		

a. after < before
b. after > before
c. after = before

Test Statistics[a]

	after - before
Z	-1.548[b]
Asymp. Sig. (2-tailed)	.122

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Decision:

Since, p_{val}>alpha so we accept H0

Hence we conclude that training isn’t beneficial.

Lab no: 13

The following dataset represents the score of 7 students in two attempts.

Before	After
4	8
6	5
7	9
11	12
15	18
19	17
5	10

Use Wilcoxon sign rank test to test whether there is significant difference between score of students in two attempts.

Solution:

Hypothesis

H0:Md1=Md2 i.e. there is no significance difference between score of students in 2 attempts.

H1: Md1≠ Md2 i.e. there is significance difference between score of students in 2 attempts.

Level of significance

Alpha= 5%

Critical value:

Ranks

		N	Mean Rank	Sum of Ranks
after - before	Negative Ranks	2[a]	2.50	5.00
	Positive Ranks	5[b]	4.60	23.00
	Ties	0[c]		
	Total	7		

a. after < before
b. after > before
c. after = before

Test Statistics[a]

	after - before
Z	-1.527[b]
Asymp. Sig. (2-tailed)	.127

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Decision:

Since P_{val}>alpha so we accept H0.
Hence we conclude that there is no significance difference between score o

Lab no. 14 (Mann Whitney U test):

The following dataset represent the age of male and female employee of certain company.

Age of male	36	48	25	33	22	40	35
Age of female	20	28	35	42	46	25	29

At 5% level of significant test whether there is significance difference between age of male and female employee. Use man Whitney U test.

Solution:

Hypothesis:

H0:Md1=Md2 i.e. there is no significant difference between age of male and female.

H1: Md1≠ Md2 i.e. there is significant difference between age of male and female.

Level of significance

Alpha= 5%

Test statistics:

Ranks

	group	N	Mean Rank	Sum of Ranks
age	male	7	8.00	56.00
	female	7	7.00	49.00
	Total	14		

Test Statistics[a]

	age
Mann-Whitney U	21.000
Wilcoxon W	49.000
Z	-.448
Asymp. Sig. (2-tailed)	.654
Exact Sig. [2*(1-tailed Sig.)]	.710[b]

a. Grouping Variable: group

b. Not corrected for ties.

Decision:

Since, P_{val} >alpha so we accept H0.

Hence we conclude that there is no significant difference between age of male and female employee.

Lab no: 15

The following datasets represents the problem-solving time of two groups of students.

Group I	Group II
12	16
20	10
16	18
22	24
30	19
11	21
39	40

At 5% level of significance, test whether the problem solving time of two group of student is similar. Use Mann- Whitney U test.

Solution:

Hypothesis

H0:Md1=Md2 i.e. the problem solving time is similar

H1: Md1≠Md2 i.e. the problem solving time isn't similar.

Level of significance

Alpha= 5%

Test statistics:

Ranks

	group	N	Mean Rank	Sum of Ranks
time	group I	7	7.50	52.50
	group II	7	7.50	52.50
	Total	14		

Test Statistics[a]

	time
Mann-Whitney U	24.500
Wilcoxon W	52.500
Z	.000
Asymp. Sig. (2-tailed)	1.000
Exact Sig. [2*(1-tailed Sig.)]	1.000[b]

a. Grouping Variable: group
b. Not corrected for ties.

Decision:

Here P_{val}>alpha so we accept H0

Hence we conclude that the problem solving time is similar.