C. Perform testing of hypothesis using paired t-test.

The T distribution provides a good way to perform one sample tests on the mean when the population variance is not known provided the population is normal or the sample is sufficiently large so that the Central Limit Theorem applies.

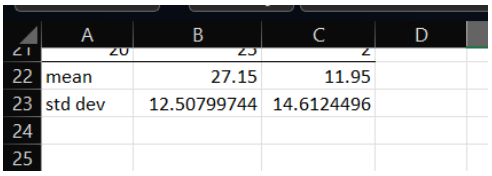
Paired Sample t Test

Example: A college Principal informed classroom teachers that some of their students showed unusual potential for intellectual gains. One months later the students identified to teachers as having potential for unusual intellectual gains showed significantly greater gains performance on a test said to measure IQ than did students who were not so identified. Below are the data for the students:

	experimental	comparison
1	35	2
2	40	27
3	12	38
4	15	31
5	21	1
6	14	19
7	46	1
8	10	34
9	28	3
10	48	1
11	16	2
12	30	3
13	32	2
14	48	1
15	31	2
16	22	1
17	12	3
18	39	29
19	19	37
20	25	2

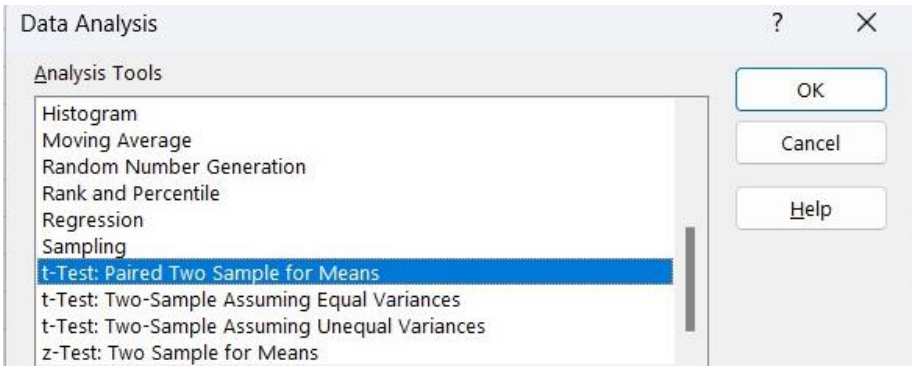
H0 represents that the difference in gain scores is not likely the result of the experimental treatment.
H1 represents that the difference in gain scores is likely the result of the experimental treatment and not the result of chance variation.

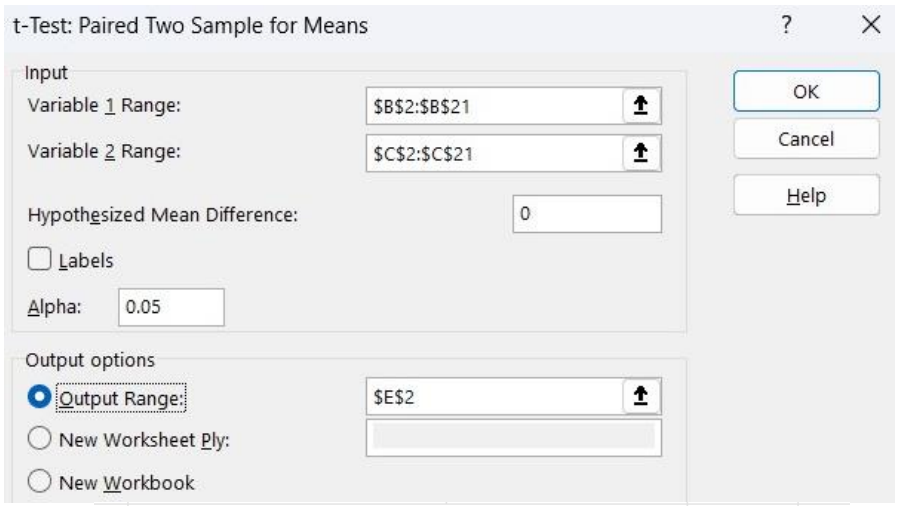
Experimental Data
To calculate Standard Mean, go to cell B22 and type =AVERAGE (B2:B21) To calculate Standard Deviation, go to cell B23 and type =STDEV (B2:B21)
Comparison Data
To calculate Standard Mean, go to cell C22 and type =AVERAGE (C2:C21) To calculate Standard Deviation, go to cell C23 and type =STDEV (C2:C21)



	A	B	C	D
22	mean	27.15	11.95	
23	std dev	12.50799744	14.6124496	
24				
25				

Find T-test Statistics, go to Data > Data Analysis> Click on Ok.

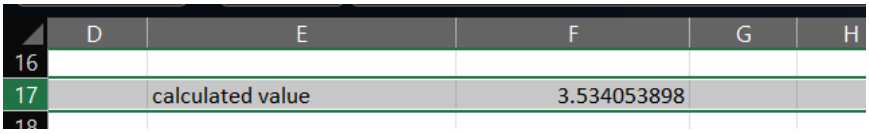




t-Test: Paired Two Sample for Means

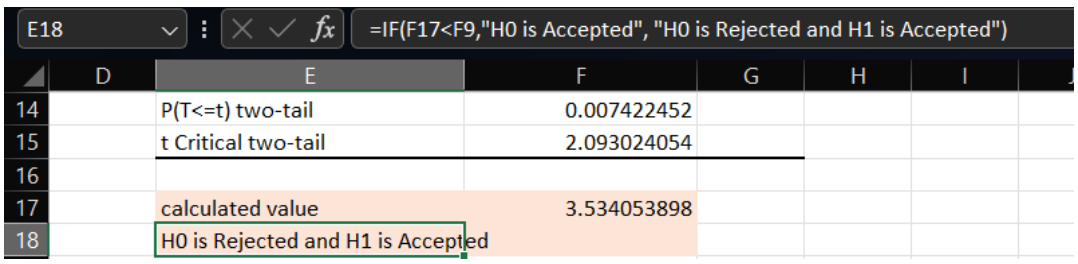
	Variable 1	*Variable 2*
Mean	27.15	11.95
Variance	156.45	213.5237
Observations	20	20
Pearson Correlation	-0.395904927	
Hypothesized Mean Difference	0	
df	19	
t Stat	2.996289153	
P(T<=t) one-tail	0.003711226	
t Critical one-tail	1.729132812	
P(T<=t) two-tail	0.007422452	
t Critical two-tail	2.093024054	

To calculate the T-Test square value go to cell F17 and type =(B22- C22)/SQRT(((B23*B23)/COUNT (B2:B21)) +((C23*C23)/ COUNT (C2:C21)))



	D	E	F	G	H
16					
17		calculated value	3.534053898		

Now go to cell F18 and type =IF (F17<F9,"H0 is Accepted", "H0 is Rejected and H1 is Accepted")



E18 =IF(F17<F9,"H0 is Accepted", "H0 is Rejected and H1 is Accepted")

	D	E	F	G	H	I
14		P(T<=t) two-tail	0.007422452			
15		t Critical two-tail	2.093024054			
16						
17		calculated value	3.534053898			
18		H0 is Rejected and H1 is Accepted				

Our calculated value is larger than the tabled value at alpha = 0.05, so we reject the null hypothesis and accept the alternative hypothesis, namely, that the difference in gain scores is likely the result of the experimental treatment and not the result of chance variation.