

### *t*-Test for Correlated Samples

#### Group 2

#### Musical Performance Quality

1. Perform some preliminary computations.

subject	pretest score	posttest score		
$i$	$X_i$	$Y_i$	$D_i$	$D_i^2$
1	20	18	-2	4
2	19	20	1	1
3	18	11	-7	49
4	10	13	3	9
5	23	22	-1	1
6	9	18	9	81
7	14	16	2	4
8	11	11	0	0
9	18	20	2	4
10	21	12	-9	81
11	14	14	0	0
12	21	18	-3	9
13	14	11	-3	9
14	14	18	4	16
15	12	17	5	25
16	14	22	8	64
17	12	14	2	4
18	21	13	-8	64

count

$N$   
18

$\bar{D}$   
0.17

2. Calculate the standard error of the difference between two means when observations are paired.

$$s_D = \sqrt{\frac{\sum_{i=1}^N D_i^2 - \frac{(\sum_{i=1}^N D_i)^2}{N}}{N(N-1)}} = 20.62$$

3. Calculate the t-ratio.

$$t = \frac{\bar{D}}{s_d} = 0.01$$

4. Evaluate the null hypothesis.

$$H_0: \mu_X = \mu_Y$$

$$H_A: \mu_X \neq \mu_Y$$

With 17 degrees of freedom, the critical  $t$ -value of 2.110 is required for significance at the .05 level for a two-tailed test.

Since the obtained  $t$ -value is 0.01, one would accept the null hypothesis and conclude that the difference between means is not statistically significant.