

Q2:

Treatment x	Treatment y	$(x - \bar{x})^2$	$(y - \bar{y})^2$
13.5	10.1	10.96	86.27
23.0	27.6	38.36	67.43
13.2	13.8	13.04	31.23
12.7	13.1	16.90	39.54
22.1	25.6	27.98	38.59
17.5	26.7	0.48	53.46
20.1	28.9	10.82	90.47
22.5	30.1	32.37	114.74
19.0	25.4	4.79	36.14
21.9	21.9	25.90	6.31
13.2	12.1	13.04	53.12
11.0	13.4	33.76	35.86
12.8	12.3	16.08	50.24
13.1	11.9	13.77	56.07
11.6	22.2	27.15	7.91
23.0	12.3	38.31	50.24
13.2	22.2	13.04	7.91
22.9		37.08	
13.1		13.77	

$$n_1 = 19$$

$$\bar{x} = 16.81$$

$$n_2 = 17$$

$$\bar{y} = 19.39$$

$$\Sigma(x - \bar{x}) \quad \Sigma(y - \bar{y})$$

$$387.54 \quad 825.54$$

Variance

$$S_x^2 = \frac{\Sigma (x - \bar{x})^2}{n-1} = \frac{387.54}{18} = 21.53$$

$$S_y^2 = \frac{\Sigma (y - \bar{y})^2}{n-1} = \frac{825.54}{16} = 51.60$$

$$f_{\text{stat}} = \frac{\text{High } S^2}{\text{Low } S^2} = \frac{51.60}{21.53} = 2.40$$

$$f_{\text{crit}} = 2.25$$

$f_{\text{stat}} > f_{\text{crit}} \quad \therefore \text{unequal variance.}$

$$t = \frac{(\bar{x} - \bar{y})}{\sqrt{\left(\frac{S_x^2}{n_1} + \frac{S_y^2}{n_2} \right)}} = \frac{16.81 - 19.39}{\sqrt{\frac{21.53}{19} + \frac{51.60}{17}}}$$

$$t = \frac{-2.58}{\sqrt{1.13 + 3.04}} = \frac{-2.58}{2.04} = -1.26$$

$$DOF = \frac{\left(\frac{Sx^2}{n_1} + \frac{Sy^2}{n_2} \right)^2}{\frac{\left(\frac{Sx^2}{n_1} \right)^2}{n_1 - 1} + \frac{\left(\frac{Sy^2}{n_2} \right)^2}{n_2 - 1}}$$

$$= \frac{(1.13 + 3.04)^2}{\frac{(1.13)^2}{18} + \frac{(3.04)^2}{16}}$$

$$DOF = \frac{17.39}{0.07 + 0.58} = 26.75 \approx 27$$

$$t_{crit} = 2.052$$

$$t_{stat} = -1.26$$

\therefore fail to reject H_0 .