(2)

$|f|_{tab.} = 3.73, \quad |f|_{cal} = 1.54$

$|f|_{cal} < |f|_{Tab}$ Ho is accepted.

Q Two independent samples of 8 and 7 items respectively had the following values of the variables:

Sample-I : 9 11 13 11 15 9 12 14

Sample-II : 10 12 10 14 9 8 10

Do the Two estimates of population variance differ significance? given that for (7,6) d.f the value of f at 5% level of Significance is 4.21

Sol $\bar{x} = \frac{1}{n}\Sigma x = 94/8 = 11.75, \quad \bar{y} = \frac{1}{n_2}\Sigma y = \frac{73}{7} = 10.43$

x as previous Question

9

11 $\quad \Sigma(x-\bar{x})^2 = 33.5$

13 $\quad \Sigma(y-\bar{y})^2 = 23.74$

11 $\quad s_x^2 = \frac{\Sigma(x-\bar{x})^2}{n_1-1} = \frac{33.5}{8-1} = 4.8$

15 $\quad s_y = \frac{\Sigma(y-\bar{y})^2}{n_2-1} = \frac{23.74}{7-1} = 3.95$

9 $\quad f = \frac{s_x^2}{s_y^2} = \frac{4.8}{3.95} = 1.21$

12

14 $\quad |f|_{Tab} = 4.21, \quad |f|_{cal} = 1.21$

Ho : there is no significance diff. b/w variance.

$\because |f|_{cal} < |f|_{Tab} \therefore$ Ho is accepted.

$|f|_{Tab.} = 3.73$, $|f|_{cal.} = 1.54$; $|f|_{cal} < |f|_{Tab.}$

∴ Ho is accepted.

Q Two random sample drawn from Two normal population are.

sample : I :- 20, 16, 26, 27, 23, 22, 18, 24, 25, 19

sample : II :- 27, 33, 42, 35, 32, 34, 38, 28, 41, 43, 30, 37.

Do the estimates of the population variance differ significantly. ($f_{.05}$ at (11, 9) d.f = 3.11)

x	$(x-\bar{x})$	$(x-\bar{x})^2$	y	$(y-\bar{y})$	$(y-\bar{y})^2$
20	-2	4	27	-8	64
16	-6	36	33	-2	4
26	4	16	42	7	49
27	5	25	35	0	0
23	1	1	32	-3	9
22	0	0	34	-1	1
18	-4	16	38	3	9
24	2	4	28	-7	49
25	3	9	41	6	36
19	-3	9	43	8	64
			30	-5	25
			37	2	4
$\Sigma x = 220$		$120 = \Sigma(x-\bar{x})^2$	$\Sigma y = 420$		$\Sigma(y-\bar{y})^2 = 314$

$$\bar{x} = \frac{\Sigma x}{n_1} = \frac{220}{10} = 22, \quad \bar{y} = \frac{420}{12} = 35$$

$$s_x^2 = \frac{\Sigma(x-\bar{x})^2}{n_1 - 1} = \frac{120}{9} = 13.33$$

$$s_y^2 = \frac{\Sigma(y-\bar{y})^2}{n_2 - 1} = \frac{314}{11} = 28.55$$

$$s_y^2 > s_x^2 \quad f = \frac{s_y^2}{s_x^2} = \frac{28.55}{13.33} = 2.14$$

Ho : there is no significance diff. b/w variances.

$|f|_{Tab} = 3.11$, $|f|_{cal} = 2.14$ $|f|_{cal.} < |f|_{Tab}$ ∴ Ho is accepted the 5 per cent value of F for $n_1 = 7$ and $n_2 = 9$, ~~ge~~ degrees of freedom is 3.29.

Sol^n $n_1 = 8$, $n_2 = 10$, $\Sigma(x-\bar{x})^2 = 84.4$, $(\Sigma y-\bar{y})^2 = 102.$

$$s_x^2 = \frac{1}{n_1-1}\Sigma(x-\bar{x})^2 = \frac{84.4}{7} = 12.057$$

$$s_y^2 = \frac{1}{n_2-1}\Sigma(y-\bar{y})^2 = \frac{102.6}{9} = 11.4$$

H_0: suppose that two samples are from populations with same variance

$$F = s_x^2/s_y^2 = \frac{12.057}{11.4} = 1.057$$

$|F|_{Tab.}$ for $(7, 9)$ d.f $= 3.29$

$|F|_{cal} < |F|_{Tab.}$, H_0 is accepted.

Q Two sample of sizes 9 and 8 give the sum of squares of deviations from their respective means equal to 160 inches and 91 inches square respectively can they be regarded as drawn from the two normal population with same variance. ($F_{.05}$ for 8, 7 d.f. $= 3.73$)

H_0: suppose two samples have been drawn from two normal population with same variance.

$$s_x^2 = \frac{\Sigma(x-\bar{x})^2}{n_1-1} = \frac{160}{9-1} = 20,$$

$$s_y^2 = \frac{\Sigma(y-\bar{y})^2}{n_2-1} = 91/8-1 = 13 \quad \Big| \quad F = \frac{s_x^2}{s_y^2} = \frac{20}{13} = 1.54$$

F - Test

Let x_i $(i = 1, \ldots, n_1)$ and y_j $(j = 1, 2, 3, \ldots, n_2)$ be two independent random samples (with means $\bar{x}$ and $\bar{y}$ respectively) drawn from normal population with same variance.

Let $$s_x^2 = \frac{1}{n_1 - 1} \sum_{i=1}^{n_1} (x_i - \bar{x})^2$$

$$s_y^2 = \frac{1}{n_2 - 1} \sum_{j=1}^{n_2} (y_j - \bar{y})^2$$

the f - statistic is given by

(i) $$f = \frac{s_x^2}{s_y^2} \quad (s_x^2 > s_y^2)$$

(ii) $$f = \frac{s_y^2}{s_x^2} \quad (s_y^2 > s_x^2)$$

Note greater value from s_x^2, s_y^2 will be taken as numerator.

In first case we say that f has $(n_1 - 1, n_2 - 1)$ degree of freedom in the second case we say that f has $(n_2 - 1, n_1 - 1)$ d.f

H_0 : the Two samples have been drawn from normal population with the same variance

Q In one sample of 8 observations the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6 : Test whether this difference is significant at 5 percent level, given that