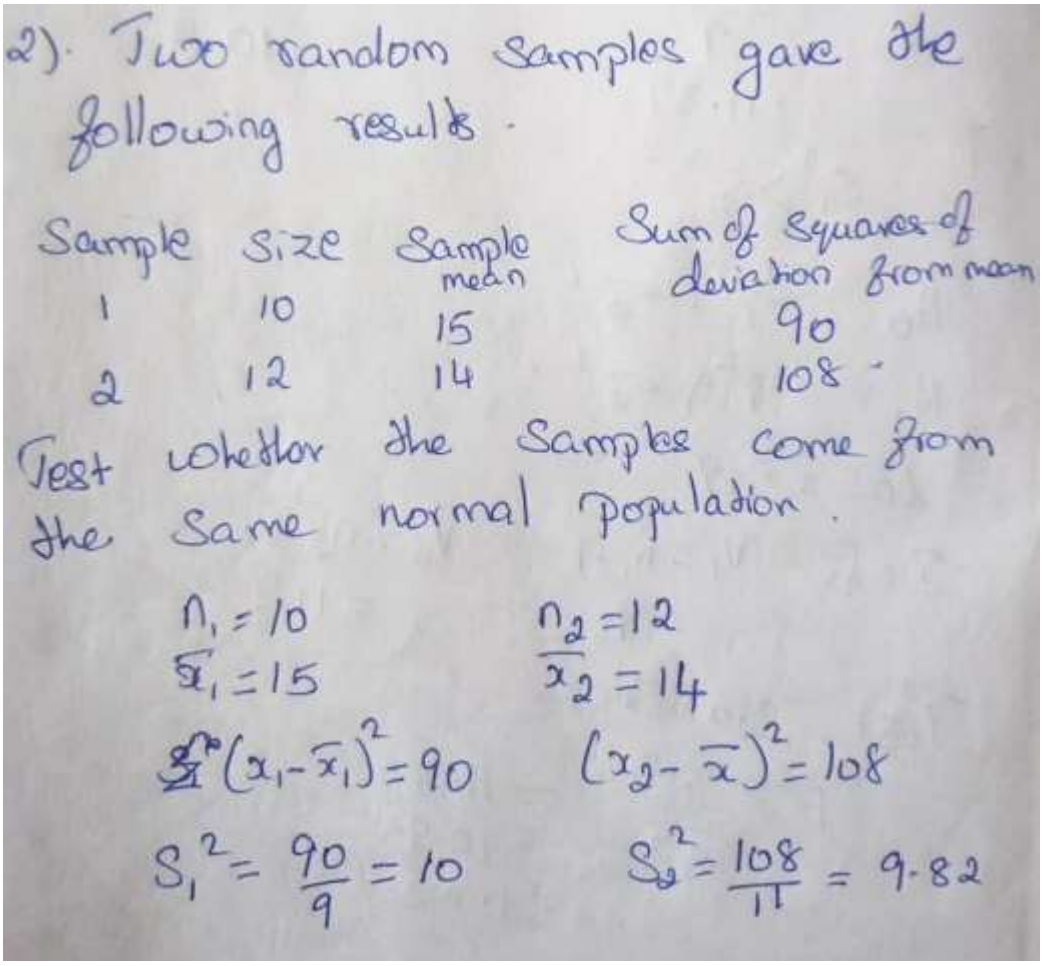
Topic: 1.9 – F Distributions



2). Two random samples gave the following results.

Sample	size	Sample mean	Sum of squares of deviation from mean
1	10	15	90
2	12	14	108

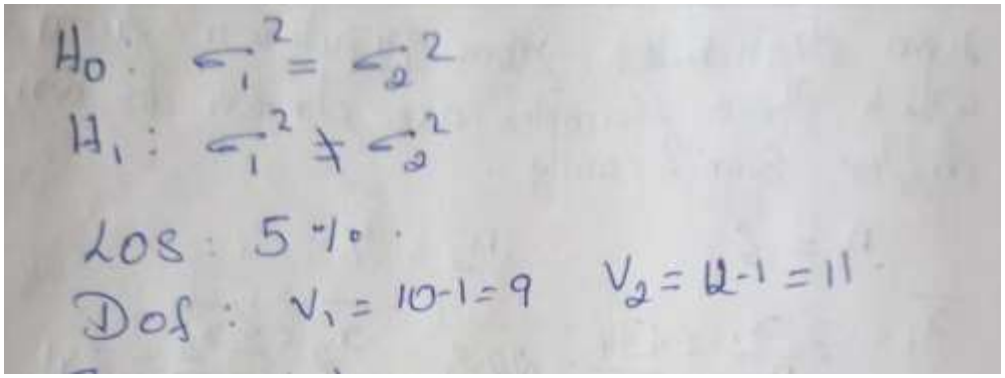
Test whether the samples come from the same normal population.

$n_1 = 10$ $\quad n_2 = 12$

$\bar{x}_1 = 15$ $\quad \bar{x}_2 = 14$

$\sum (x_1 - \bar{x}_1)^2 = 90$ $\quad (x_2 - \bar{x})^2 = 108$

$S_1^2 = \frac{90}{9} = 10$ $\quad S_2^2 = \frac{108}{11} = 9.82$

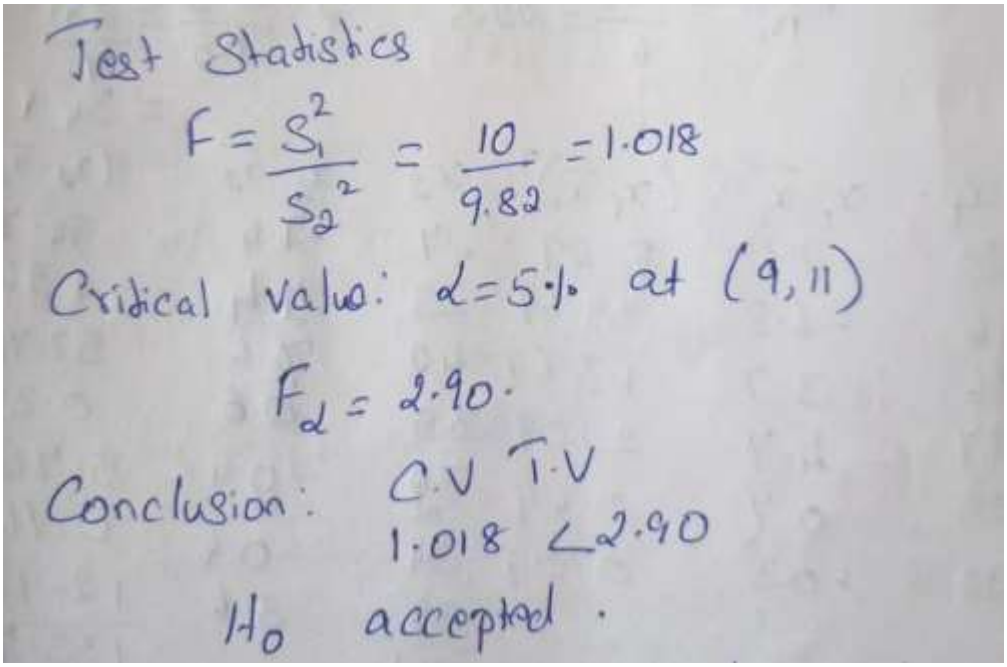


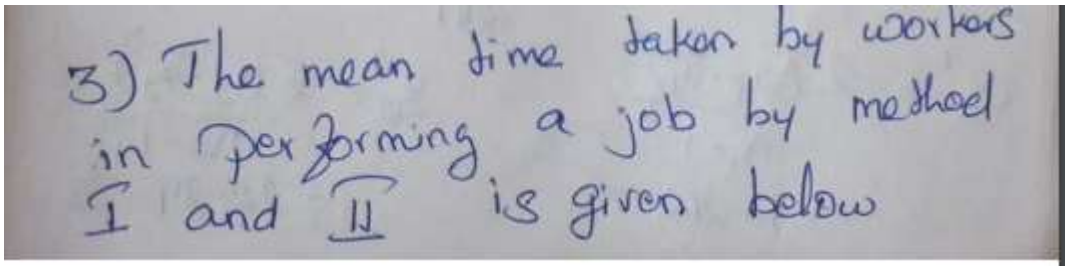
$H_0 : \sigma_1^2 = \sigma_2^2$

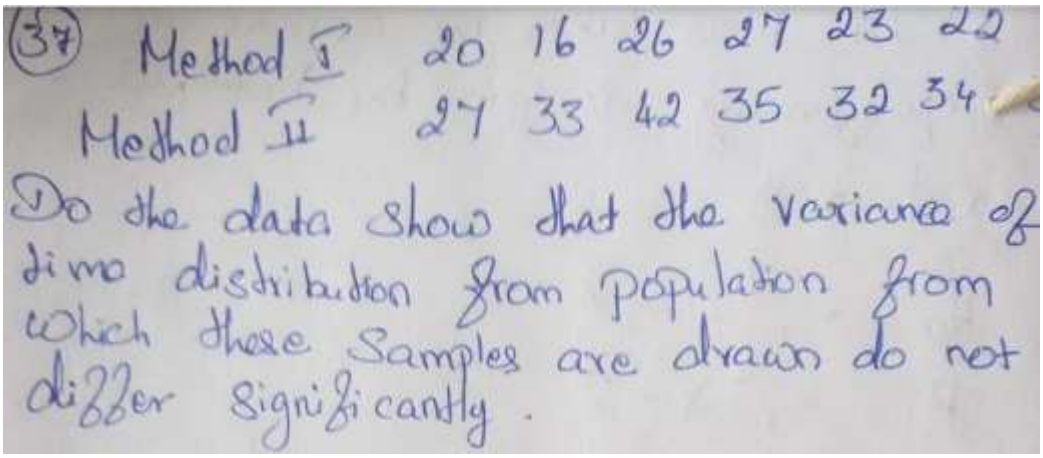
$H_1 : \sigma_1^2 \neq \sigma_2^2$

LOS : 5%.

Dof : $V_1 = 10 - 1 = 9$ $\quad V_2 = 12 - 1 = 11$


Test Statistics
$F = \frac{S_1^2}{S_2^2} = \frac{10}{9.82} = 1.018$
Critical value: $\alpha = 5\%$ at $(9, 11)$
$F_\alpha = 2.90$.
Conclusion: C.V T.V
$1.018 < 2.90$
H_0 accepted.


3) The mean time taken by workers in performing a job by method I and II is given below


(37) Method I 20 16 26 27 23 22
Method II 27 33 42 35 32 34
Do the data show that the variance of time distribution from population from which these samples are drawn do not differ significantly.

$n_1 = 6$ $n_2 = 7$.

$\bar{x}_1 = \frac{\Sigma x_1}{n_1} = \frac{134}{6} = 22.3$ $\bar{x}_2 = \frac{\Sigma x_2}{n_2} = \frac{241}{7} = 34.4$

x_1	$x_1 - \bar{x}_1$	$(x_1 - \bar{x})^2$	x_2	$x_2 - \bar{x}_2$	$(x_2 - \bar{x}_2)$
20	-2.3	5.29	27	-7.4	54.76
16	-6.3	39.69	33	-1.4	1.96
26	3.7	13.69	42	7.6	57.76
27	4.7	22.09	35	0.6	0.36
23	0.7	0.49	32	-2.4	5.76
22	-03	0.09	34	-0.4	0.16
			38	3.6	12.96
			241		133.72

$S_1^2 = \frac{\Sigma (x_1 - \bar{x}_1)^2}{n_1 - 1} = 16.268$ $S_2^2 = \frac{\Sigma (x_2 - \bar{x}_2)^2}{n_2 - 1} = 22.29$

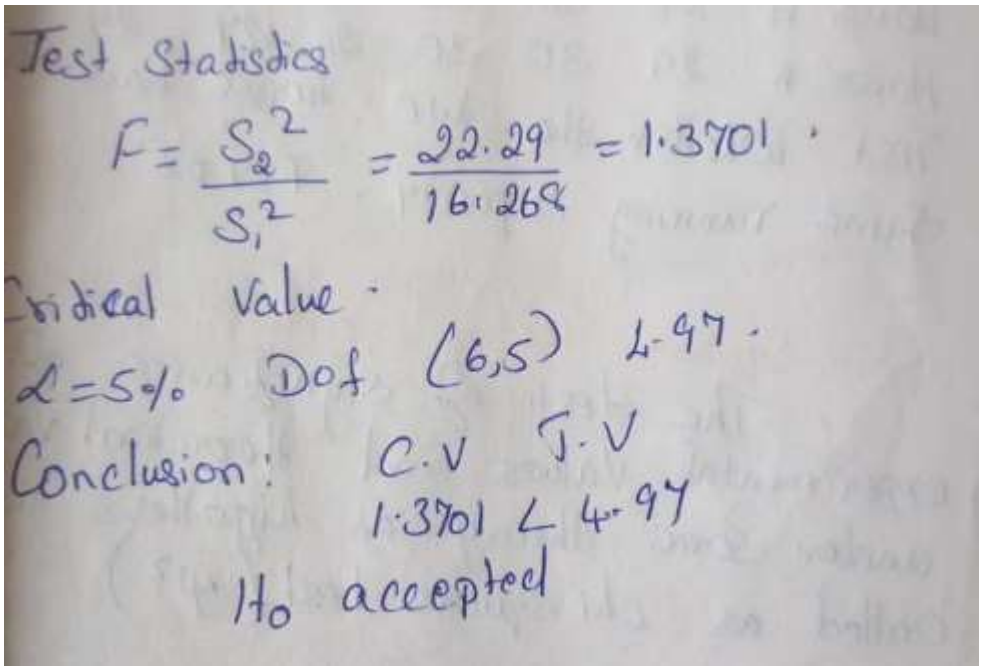
$H_0 : \sigma_1^2 = \sigma_2^2$

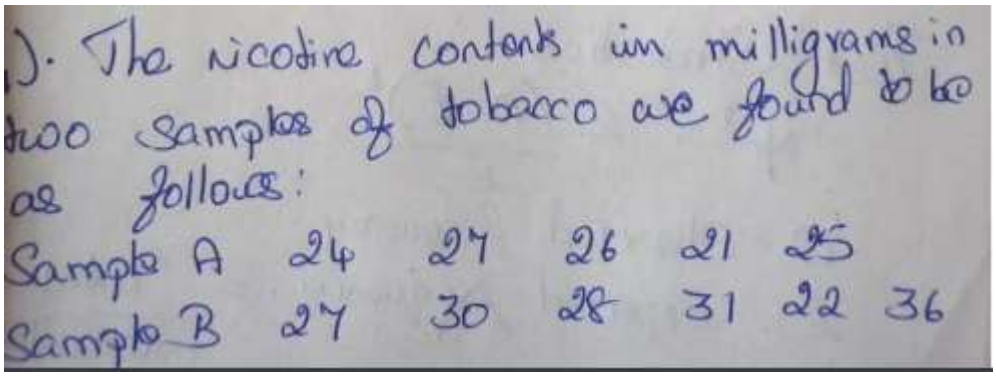
$H_1 = \sigma_1^2 \neq \sigma_2^2$

LOS : $\alpha = 5\%$

D of $V_1 = n_1 - 1 = 5$ $V_2 = n_2 - 1 = 6$.

$S_2^2 > S_1^2$


Test Statistics
$F = \frac{S_2^2}{S_1^2} = \frac{22.29}{16.268} = 1.3701$
Critical Value.
$\alpha = 5\%$ Dof (6,5) 4.97.
Conclusion: C.V T.V
1.3701 < 4.97
H_0 accepted


). The nicotine contents in milligrams in two samples of tobacco are found to be as follows:
Sample A 24 27 26 21 25
Sample B 27 30 28 31 22 36