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Topic: 2.7 – Randomized Block Design

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.

$$n_1 = 10 \qquad n_2 = 12$$
$$\bar{x}_1 = 15 \qquad \bar{x}_2 = 14$$
$$\sum (x_1 - \bar{x}_1)^2 = 90 \qquad \sum (x_2 - \bar{x}_2)^2 = 108$$
$$S_1^2 = \frac{90}{9} = 10 \qquad S_2^2 = \frac{108}{11} = 9.82$$
$$H_0: \sigma_1^2 = \sigma_2^2$$
$$H_1: \sigma_1^2 \neq \sigma_2^2$$

LOS: 5%

Dof:  $v_1 = 10 - 1 = 9$      $v_2 = 12 - 1 = 11$



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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.



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$n_1 = 6$                        $n_2 = 7$

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

$x_1$	$x_1 - \bar{x}_1$	$(x_1 - \bar{x}_1)^2$	$x_2$	$x_2 - \bar{x}_2$	$(x_2 - \bar{x}_2)^2$
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	34	-0.4	0.16
22	-0.3	0.09	34	-0.4	0.16
			38	3.6	12.96
			<u>241</u>		<u>133.72</u>

$S_1^2 = \frac{\sum (x_1 - \bar{x}_1)^2}{n_1 - 1} = \frac{241}{5} = 48.2$

$S_2^2 = \frac{\sum (x_2 - \bar{x}_2)^2}{n_2 - 1} = \frac{133.72}{6} = 22.29$

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

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

LOS:  $\alpha = 5\%$

Dof  $V_1 = n_1 - 1 = 5$      $V_2 = n_2 - 1 = 6$

$S_2^2 > S_1^2$



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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 J.V  
1.3701 < 4.97  
 $H_0$  accepted

1). 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