Amey Thakur SE-Comps B-50

Practice Test AM-IV

Class: SE B - 50 **Date: 08/05/2020** **Time: 10 AM to 11AM**

Q.01 Find all basic, feasible and degenerate solutions of the equations

$$2x_1 + 6x_2 + 2x_3 + x_4 = 3,\ 6x_1 + 4x_2 + 4x_3 + 6x_4 = 2$$

Q.18 A certain injection administered to 12 patients resulted in the following changes of blood pressure: 5 , 2 , 8 , -1 , 3 . 0 , 6 , -2 , 1 , 5 , 0 , 4 .Can it be concluded that the injection will be in general accompanied by an increase in Blood pressure ?

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Q.1.

Sol^n:

$2x_1 + 6x_2 + 2x_3 + x_4 = 3$

$6x_1 + 4x_2 + 4x_3 + 6x_4 = 2$

Since there are four variables and 2 constraints there are $4C_2 = 6$ basic solution

No. of basic sol^n.	No. of basic Variable	Basic Variables	Eq^n & the values of basic variables	Is sol^n. feasible	degenerate
1	$x_3 = 0$ $x_4 = 0$	x_1, x_2	$2x_1 + 6x_2 = 3$ $6x_1 + 4x_2 = 2$ $x_1 = 0$ $x_2 = 1/2$	Yes	Yes
2	$x_2 = 0$ $x_4 = 0$	x_1, x_3	$2x_1 + 3x_3 = 3$ $6x_1 + 4x_3 = 2$ $x_1 = -2$ $x_3 = 7/2$	No	No
3	$x_1 = 0$ $x_4 = 0$	x_2, x_3	$6x_2 + 2x_3 = 3$ $4x_2 + 4x_3 = 2$ $x_2 = 1/2$ $x_3 = 0$	Yes	Yes
4	$x_1 = 0$ $x_3 = 0$	x_2, x_4	$6x_2 + x_4 = 3$ $4x_2 + 6x_4 = 2$ $x_2 = 1/2$ $x_4 = 0$	Yes	Yes

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5	$x_2 = 0$	x_1, x_4	$2x_1 + x_4 = 3$	No	No
	$x_3 = 0$		$6x_1 + 4x_4 = 2$		
			$x_1 = 8/3$		
			$x_2 = -7/3$		
6	$x_1 = 0$	x_3, x_4	$2x_3 + x_4 = 3$	No	No
	$x_2 = 0$		$4x_3 + 6x_4 = 2$		
			$x_3 = 2$		
			$x_4 = -1$		

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Q. 18

Soln)

N = 12 (< 30, 20 it is a small sample)

Change in blood pressure (d_i)	d_i^2
5	25
2	4
8	64
-1	1
3	9
0	0
6	36
-2	4
1	1
5	25
0	0
4	16
Total 31	185

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Step 1:

Null Hypothesis (H_0): $\mu_1 = 0$

(i.e. the injection is not accompanied by an increase in blood pressure)

Alternative Hypothesis : $\mu_1 < 0$

(i.e. the injection is accompanied by an increase in blood pressure)

(One test failed)

Step 2:

L.O.S = 5 % (Two failed test)

L.O.S = 10 % (One failed test)

Degree of freedom = $n - 1$

$= 12 - 1$

$= 11$

Critical Value (t_α) = 1.796

Step 3:

Since sample is small : $\bar{d} = \frac{\Sigma d_i}{n} = \frac{31}{12}$

$= 2.5833$

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$$S = \sqrt{\frac{\sum d_i^2}{n} - \left(\frac{\sum d_i}{n}\right)^2}$$

$$= \sqrt{\left(\frac{185}{12}\right) - \left(\frac{31}{12}\right)^2}$$

$$\Rightarrow 2.9569$$

$$S.E. = \frac{S}{\sqrt{n-1}} = \frac{2.9569}{\sqrt{11}} = 0.3915$$

Step 4 :

Test statistic $t_{cal} = \frac{\bar{d}_i - \mu}{S.E}$

$$= \frac{2.5833 - 0}{0.8915}$$

$$= 2.8976$$

Step 5 :

Decision

Since $|t_{cal}| > t_\alpha$ H_0 is rejected

∴ The injection will be in general accompanied by an increase in blood pressure