

Multivar Exam #2 Saaif Ahmed PG 2

Wednesday, November 4, 2020

8:59 PM

Honor Pledge:

"I have neither given nor received any illegal aid on this exam"

-Saaif Ahmed 11/4/20

Determine the values of the parameters a and b so that the system

$$\begin{array}{rrcr} x & + & y & + & z & = & 1 \\ x & + & 2y & + & z & = & 2 \\ x & + & y & + & (a+1)z & = & 1+b \end{array}$$

has (i) a unique solution, (ii) no solution, (iii) infinitely many solutions. Write down all the solutions in cases (i) and (iii).

i)

Equations can't match for unique solution so $a \neq 0$ and b can be anything
Thus we have $a > 0$ & $a < 0$ and $b \neq A$ & $b \in \mathbf{R}$ (all numbers)

Answer: $a \neq 0, b \neq a$

ii)

Cannot be solved if there are not enough equations
Thus we choose a and b where there isn't an equation.

Answer: $a = 0, b = 0$

iii)

$$\begin{array}{l} \left[\begin{array}{cccc} 1 & 1 & 1 & 1 \\ 1 & 2 & 1 & 2 \\ 1 & 1 & (a+1) & (1+b) \end{array} \right] \begin{array}{l} A \\ B \\ C \end{array} \end{array}$$

Need $A = C$ but not values of A and C

Thus we have $a = 0, b = x : x \in \mathbf{R} \wedge x \neq 0$

Aka $b = \text{any number that is not } 0$

Answer: $a = 0, b \neq a$