Dr. ZABIDAWI MATH 1111

Solution To Problem # 30 In Section 9.2

Solve the system of equations:

#30 $5x-2y-3z=0$ —— (1)
$3x-y-4z=0$ —— (2)
$4x-y-9z=0$ —— (3)

Let us eliminate (y).

$(-1)\times$ eq.(2) : $-3x+y+4z=0$
$4x-y-9z=0$
$x-5z=0$ —— (4)

$(-2)\times$ eq.(3) $-8x+2y+18z=0$
$5x-2y-3z=0$

$-3x+15z=0$ —— (5)
Divide by (-3) $x-5z=0$ —— (5)

Now we have:
$x-5z=0$ —— (4)
$x-5z=0$ —— (5)

$-1\times$ eq.(5) $-x+5z=0$
$x-5z=0$
$0=0$ Identity

Dr ZABDAWI

Continue #30

Here we have one degree of freedom, This means that we can set any variable (either $x, y,$ or z) to be an arbitrary constant.

let $z = c$ - Arbitrary constant

{Arbitrary constant} means any ~~number~~ real number.

so we have set $z = c$

eq. (4) $\Longrightarrow$ $x = 5c$

eq. (2) $3x - y - 4z = 0$

$\Longrightarrow$ $y = 3x - 4z$

$y = 15c - 4c = 11c$

∴ Sol. Set is $(5c, 11c, c) = c\,(5, 11, 1)$

For example let $c = 2$

∴ Sol. is $(10, 22, 2)$ let'us check it

eq. (1). $5\times10 - 2\times22 - 3\times2 = 50 - 44 - 6 = 0$ ✓

eq. (2). $3\times10 - 22 - 4\times2 = 30 - 22 - 8 = 0$ ✓

eq. (3). $4\times10 - 22 - 9\times2 = 40 - 22 - 18 = 0$ ✓