Name: 2/19/20

HansenMath™ Pre-calc: 7.3 Multivariable Linear Systems, Day 2

Warm-up:

A system of linear equations is called consistent if it has at least one solution.
A consistent system with exactly one solution is independent. A consistent system with infinitely many solutions is *dependent.* A system of linear equations is called *inconsistent* if it has no solution.

Example 1: (No solution; Inconsistent)
Solve the system of linear equations:

$$\begin{cases} x - 3y + z = 1 \\ 2x - y - 2z = 2 \\ x + 2y - 3z = -1 \end{cases}$$

[-2] EQ1: $-2x + 6y - 2z = -2$
EQ2: $2x - y - 2z = 2$
$5y - 4z = 0$ NEW EQ2

[-1] EQ1: $-x + 3y - z = -1$
EQ3: $x + 2y - 3z = -1$
$5y - 4z = -2$

$-5y + 4z = 0$
$5y - 4z = -2$
$0 = -2$ *

No soln – inconsistent

Example 2: (Infinitely Many Solutions)

$$\begin{cases} x + 0y + 4z = 13 \\ 4x - 2y + z = 7 \\ 2x - 2y - 7z = -19 \end{cases}$$

(-4) EQ1: $-4x + 0y - 16z = -52$

EQ2: $4x - 2y + z = 7$

$$-2y - 15z = -45$$

(-2) EQ1: $-2x + 0y - 8z = -26$

EQ3: $2x - 2y - 7z = -19$

$$-2y - 15z = -45$$

$x = -4a + 13$

$-2y - 15(a) = -45$

$\frac{-2y}{-2} = \frac{15a - 45}{-2}$

$y = \frac{-15}{2}a + \frac{45}{2}$

$z = a$

$0 = 0$ infinite solutions

any R #

$(-4a + 13, \frac{-15}{2}a + \frac{45}{2}, a)$

Example 3: (A non-square system; few equations than variables)

$$\begin{cases} x - 2y + z = 2 \\ 6x - 3y - 3z = 3 \end{cases}$$

$\frac{6}{3} \quad \frac{-3}{3} \quad \frac{-3}{3} \quad \frac{3}{3}$

$2x - y - z = 1$

(-2) EQ1: $-2x + 4y - 2z = -4$

EQ2: $2x - y - z = 1$

$$3y - 3z = -3$$

$x - 2(z - 1) + z = 2$

$x - 2z + 2 + z = 2$

$x - z + 2 = 2$

$x - z = 0$

$x = z$

Solve for y: $\frac{3y}{3} = \frac{3z}{3} - \frac{3}{3}$

$y = z - 1$

Into EQ 1

Let $z = a$

$a = 2\left(\frac{a}{2}, \frac{a-1}{1}, \frac{a}{2}\right)$

Assignment: Page 505, #18, 20, 22, 25, 29, 41 Thank you ☺