

Name: Key

Directions: Show all work. No credit for answers without work.

1. [2 parts, 5 points each] Solve the following systems of linear equations.

$$\begin{aligned} x + 2y + z &= 0 \\ \text{(a)} \quad 2x + 5y + 3z &= -4 \\ x + 3y + 4z &= -10 \end{aligned}$$

$$x + 2y + z = 0$$

$$y + z = -4$$

$$y + 3z = -10$$

$$x + 2y + z = 0$$

$$y + z = -4$$

$$2z = -6$$

$$\text{So, } z = -3,$$

$$y + (-3) = -4$$

$$y = -1,$$

$$x + 2(-1) + (-3) = 0$$

$$x = 5$$

$$\underline{1 \text{ soln: } x=5, y=-1, z=-3.}$$

$$\begin{aligned} \text{(b)} \quad x + 3y + z &= 2 \\ 3x + 7y + 7z &= 8 \end{aligned}$$

$$x + 3y + z = 2$$

$$-2y + 4z = 2$$

$$x + 3y + z = 2$$

$$y - 2z = -1$$

For each k , we get a soln with

$$z = k,$$

$$y - 2k = -1$$

$$y = 2k - 1,$$

$$x + 3(2k - 1) + k = 2$$

$$x + 7k - 3 = 2$$

$$x = 5 - 7k$$

Infinitely many solns of the form:

$$x = 5 - 7k, y = 2k - 1, z = k.$$