Chapter 1 Section 2

Andrew Taylor

March 16 2022

Problem 1. *Find all solutions for the equations*

$$\left|\begin{array}{c} x+y-2z=5 \\ 2x+3y+4z=2 \end{array}\right|$$

Solution 1. *We can use Gauss-Jordan elimination.*

$$\left|\begin{array}{cccc} 1 & 1 & -2 & 5 \\ 2 & 3 & 4 & 2 \end{array}\right|$$

$$\left|\begin{array}{cccc} 1 & 1 & -2 & 5 \\ 0 & 1 & 8 & -8 \end{array}\right|$$

$$\left|\begin{array}{cccc} 1 & 0 & -10 & 13 \\ 0 & 1 & 8 & -8 \end{array}\right|$$

This gives us the equations $x-10z=13$ *and* $y+8z=-8$.

Thus there are infinitely many solutions. The solutions are

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 13+10t \\ -8-8t \\ t \end{pmatrix}$$

for an arbitrary real number t.