Math 307 Homework
August 24, 2015

1. Suppose that $x_1 = c_1, \ldots, x_n = c_n$ is a solution of the linear system

$$\begin{aligned} a_{11}x_1 + \cdots + a_{1n}x_n &= b_1, \\ &\vdots \\ a_{m1}x_1 + \cdots + a_{mn}x_n &= b_m. \end{aligned}$$

   Under what circumstances is $x_1 = 2c_1, \ldots, x_n = 2c_n$ also a solution?

2. Give a geometric description of the set of all solutions for each of the following linear systems.

   (a)
   $$0x + 0y + z = 0.$$

   (b)
   $$\begin{aligned} 0x + 0y + z &= 0, \\ 0x + y + 0z &= 0. \end{aligned}$$

   (c)
   $$\begin{aligned} 0x + 0y + z &= 0, \\ 0x + y + 0z &= 0, \\ x + 0y + 0z &= 0. \end{aligned}$$

   (d)
   $$\begin{aligned} 0x + 0y + z &= 0, \\ 0x + y + 0z &= 0, \\ x + 0y + 0z &= 0, \\ x + y + z &= 0. \end{aligned}$$

   (e)
   $$\begin{aligned} 0x + 0y + z &= 0, \\ 0x + y + 0z &= 0, \\ x + 0y + 0z &= 0, \\ x + y + z &= 1. \end{aligned}$$