Math 1553 Worksheet: Fundamentals and §1.1

- 1. a) (Warm-up) Draw the set of all points in \mathbb{R}^2 that satisfy the equation x y = 0, where we use (x, y) to denote points in \mathbb{R}^2 .
 - **b)** Draw the set of all points in \mathbb{R}^3 that satisfy the equation x y = 0, where we use (x, y, z) to denote points in \mathbb{R}^3 . Geometrically, does this set form a line, a plane, or something else?

- **2.** Richard Straker has eight light switches in order along a wall. He records which lights are on and which lights are off. To save time, he uses 0 to represent "off" and using 1 to represent "on" for each light.
 - a) Write an element of Rⁿ (for some n) that represents the situation when all the lights are on. What is n?

b) Repeat part (a) when all lights are off.

3. Find all values of *h* so that the lines x + hy = -5 and 2x - 8y = 6 do *not* intersect, and indicate what this means for the set of solutions to the linear system of equations

$$x + hy = -5$$
$$2x - 8y = 6.$$

For all *h* so that the lines do not intersect, draw the line x + hy = -5 and the line 2x - 8y = 6 to verify that they do not intersect.

4. Consider the following three planes, where we use (x, y, z) to denote points in \mathbb{R}^3 :

$$2x + 4y + 4z = 1$$
$$2x + 5y + 2z = -1$$
$$y + 3z = 8$$

a) Do all three of the planes intersect? If so, do they intersect at a single point, a line, or a plane?

b) Looking ahead to 1.2: Write an augmented matrix corresponding to the system of equations whose solution set is the intersection of the three planes.