## 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 R<sup>n</sup> (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.** Consider the following three planes, where we use (x, y, z) to denote points in  $\mathbb{R}^3$ :

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

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

**4.** 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

$$\begin{aligned} x + hy &= -5\\ 2x - 8y &= 6. \end{aligned}$$

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.