Math 1553 Worksheet: Fundamentals and §2.1

1. For each equation, determine whether the equation is linear or non-linear. Circle your answer. If the equation is non-linear, briefly justify why it is non-linear.

a) $3x_1 + \sqrt{x_2} = 4$ Linear Not linear

b) $x^2 + y^2 = z$ Linear Not linear

c) $e^{\pi}x + \ln(13)y = \sqrt{2} - z$ Linear Not linear

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

$$\begin{aligned} 2x + 4y + 4z &= 1 \\ 2x + 5y + 2z &= -1 \\ y + 3z &= 8 \end{aligned}$$

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

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