Math 1553 Worksheet: Fundamentals and §1.1

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) \( 3x + \sqrt{x_2} = 4 \) \quad Linear \quad Not linear

   b) \( x^2 + y^2 = z \) \quad Linear \quad Not linear

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

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

   \[
   \begin{align*}
   2x + 4y + 4z &= 1 \\
   2x + 5y + 2z &= -1 \\
   y + 3z &= 8 \\
   \end{align*}
   \]

   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.