# 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) $x_1 = x_2 - x_3 + 10x_4$      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 $\mathbf{R}^3$:
$$2x + 4y + 4z = 1$$
$$2x + 5y + 2z = -1$$
$$y + 3z = 8$$
   Do all three of the planes intersect? If so, do they intersect at a single point, a line, or a plane?

**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.