

Math 210 (Lesieutre)
12.1: Planes and surfaces, part 2
February 1, 2017

Problem 1. Consider the two planes given by the following equations:

$$\begin{aligned}x + 2y + 3z &= 0 \\x - y + z &= 2\end{aligned}$$

These planes intersect in a line. Give a parametrization of this line, and check that your line is actually contained in the first plane.

Problem 2. a) Graph the cylinder $x^2 + 2x + 4z^2 = 15$.

Problem 3. Consider the surface given by

$$\frac{x^2}{25} + \frac{y^2}{25} + z^2 = 1.$$

a) Sketch the xy -, xz -, and yz - traces of this figure. Use these to guide a drawing of the entire surface.

b) Now consider the line $\mathbf{r}(t) = \langle 3t, 4t, 1 - t \rangle$. At what points does the line intersect the surface?

Problem 4. Consider the figure $x^2 + 2x + y^2 - 4y - z^2 + 4 = 0$.

a) First, complete the square to simplify the equation for the surface.

b) Next, sketch some traces of the figure. You can use the coordinate planes, but it might be better to use planes parallel to coordinate planes (for example, $y = 2$ might be a good one)

c) Use your traces to sketch the 3D surface.