

Math 210 (Lesieutre)
12.1: Planes and surfaces, part 1
January 30, 2017

Problem 1. a) What is the equation for a plane passing through $(1, 2, 3)$ and with normal vector $\langle 2, -1, 3 \rangle$?

b) At what point does this plane meet the x -axis?

c) At what point does this plane meet the line $\mathbf{r}(t) = \langle -t - 1, 2t, t + 1 \rangle$?

Problem 2. a) Find the equation of the plane containing the three points $P = (1, 3, 1)$, $Q = (1, 0, 3)$, and $R = (5, 4, -1)$.

b) Draw a sketch of the plane by computing its traces in the three coordinate planes.

Problem 3. Graph the cylinder $x^2 + 2x + 4z^2 = 15$.

Problem 4. Consider the three planes given by the following equations:

$$x + 2y + 3z = 0$$

$$x - y + z = 2$$

$$x + 2y + 3z = 6.$$

a) Two of these planes are parallel: which two? Describe the intersection of these planes.

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