

Instructions

You are encouraged to work with others on this project. As with all writing you should work out the details in draft form before writing a final solution. You should write your solution in paragraph form using complete sentences that incorporate all symbolic mathematical expressions into the grammatical structure. You should include enough detail so that a reader can follow your reasoning and reconstruct your work. You should not show every algebraic or arithmetic step. You should do your own writing of the solution even if you have worked out the details with other people. All graphs should be done carefully on graph paper or using appropriate technology. The project is due at the beginning of class on Friday, February 15.

A line in the plane can be described by a linear equation in two variables of the form $Ax + By + C = 0$. Alternatively, a line in the plane can be described parametrically by a vector formula of the form $\vec{r} = \vec{r}_0 + t\vec{d}$ where \vec{r}_0 is the position vector for a point on the line, \vec{d} is a direction vector parallel to the line, and t is a parameter. The line is the set of all points with position vectors \vec{r} as t ranges over all real numbers.

A plane in space can be described by a linear equation in three variables of the form $Ax + By + Cz + D = 0$.

1. Come up with a way to describe a plane in space parametrically using vectors. Give a geometric description of the vectors you use in the parametric description. Hint: Think about using two parameters.
2. Use your result for the first part to give a parametric description of the plane that goes through the points $(3, 2, 1)$, $(-6, 5, 9)$ and $(2, 1, -4)$.