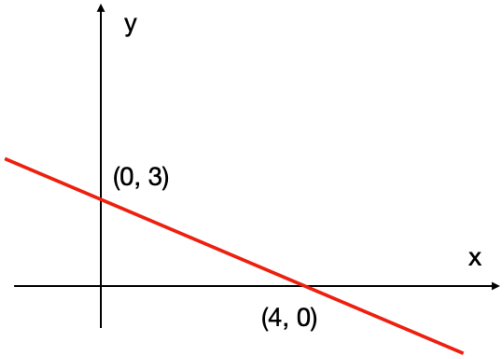
Homework 4

1. The line intersects axes at (0, 3) and (4, 0).

   Find the equation of the line in the hyperplane form: $(\overrightarrow{n}, \overrightarrow{v}) = d$

   Make || ***n*** || = 1 and find the distance to the line from the origin ***d***.



2. Find the distance from the point [1, 1, 2] to the plane x + y - z = 1.

3. A plane is given by the equation: x + 2y + 3z = 4. Does it intersect the sphere with the radius r=1 and the center at [-3, 2, 2]?

4. The vectors: (1, 0), (2, 3), (2, -2) form class A and (4, 1), (5, -3) are from class B. Find the best hyperplane that separates the classes. Which vectors do support the hyperplane? What is the margin (the distance between classes)?

   Hint: You do not need to run SVM. You can solve it by drawing the points and looking at the graph.

5. **Optional**:

   Build an SVM model based on the vectors of the two classes given in the file

svm-data.csv. Predict the class for the vectors below:

A = [1, 0, 1.5], B = [-1, 2, -2], C = [0, 0.2, 0.7], D = [1, -2, 2.5]