Homework 9

1. *Optional (3 points)*. Find the equation of the line that comes as near as possible to all the vectors below. Hint: use PCA to find the first principal vector which direction must be along the line.

   [19, 43, 25], [9, 21, 15], [12, 29, 18], [21, 46, 27], [-4, -4, 2], [24, 51, 30], [5, 14, 11]

2. Optional *(5 points)*. There are five 4D vectors:

   [1, 3, 5, 7], [-1, 2, -3, 0], [0, 1, 1,-1], [0, 2, 1, 1], [-2, 4, -5, 4]

   Find a 2D plane, so all these vectors almost belong to it. Use SVD to find it.

3. Optional *(12 points). There are twenty 6-dimensional vectors given in "dim-reduction.cvs" file. Reduce the number of dimensions of the dataset. How many columns do you need? Find a new reference frame (a new basis and a new origin) of the reduced dataset.*