

Yuan Bowei 1001016

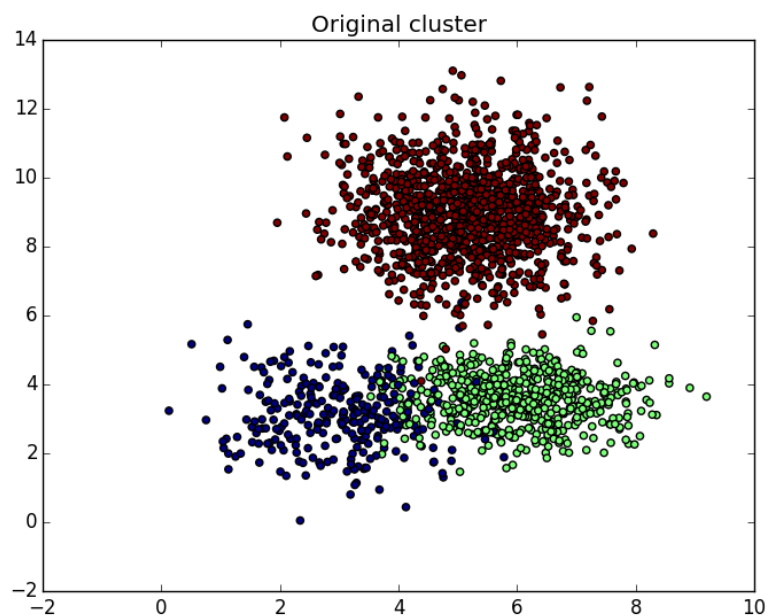
Machine Learning

October 18, 2015

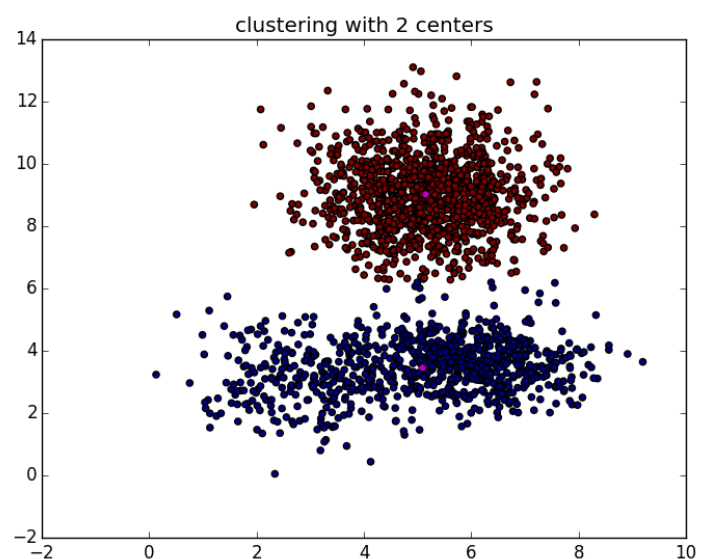
Machine Learning Assignment 3

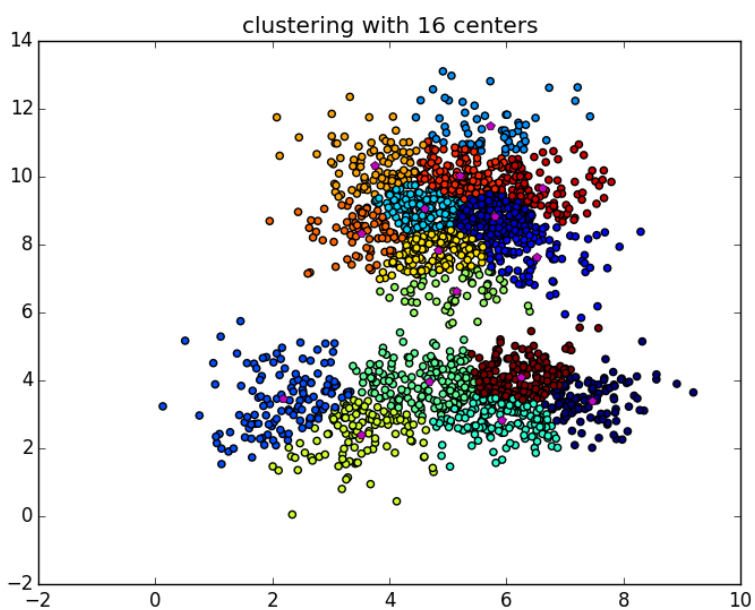
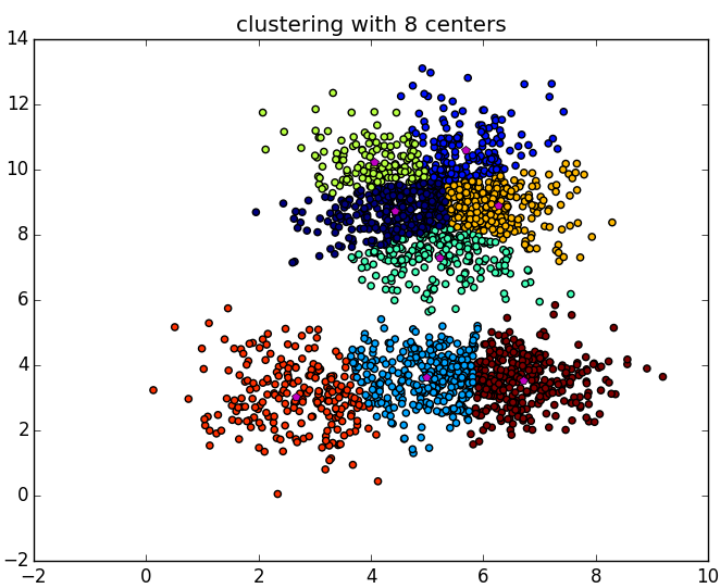
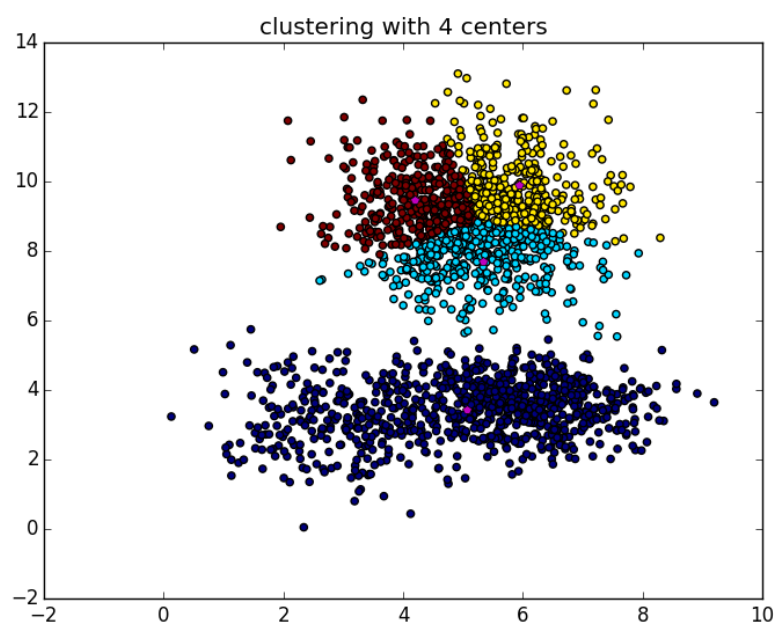
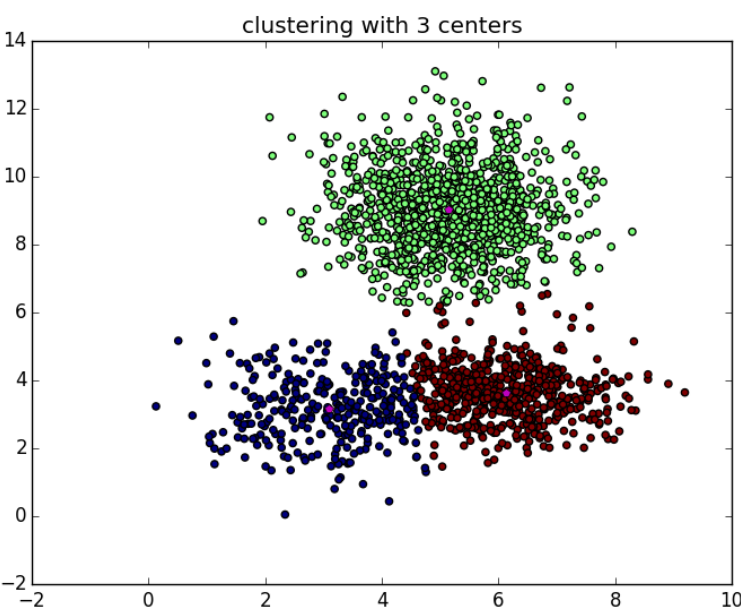
1. The data points drawn from the data generator is saved in 'points.npy' file, which could be directly loaded with `numpy.load` as an ndarray.

The plot of these data is:

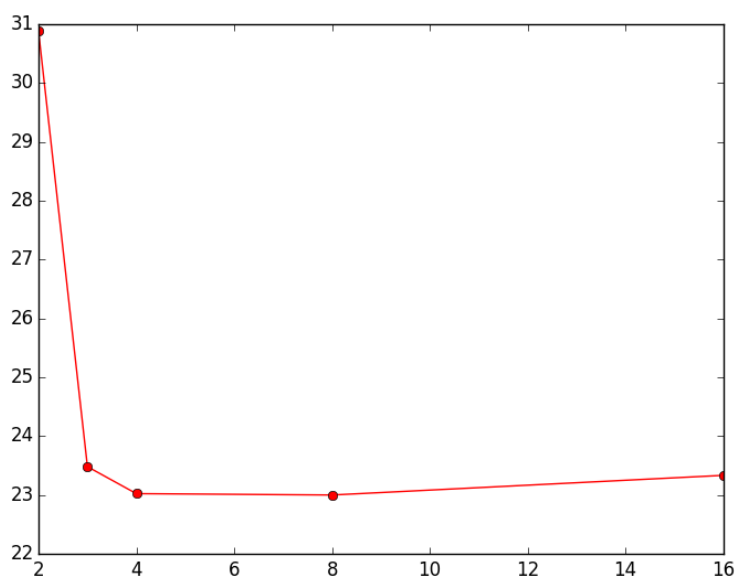


2c) The graphics are given below:

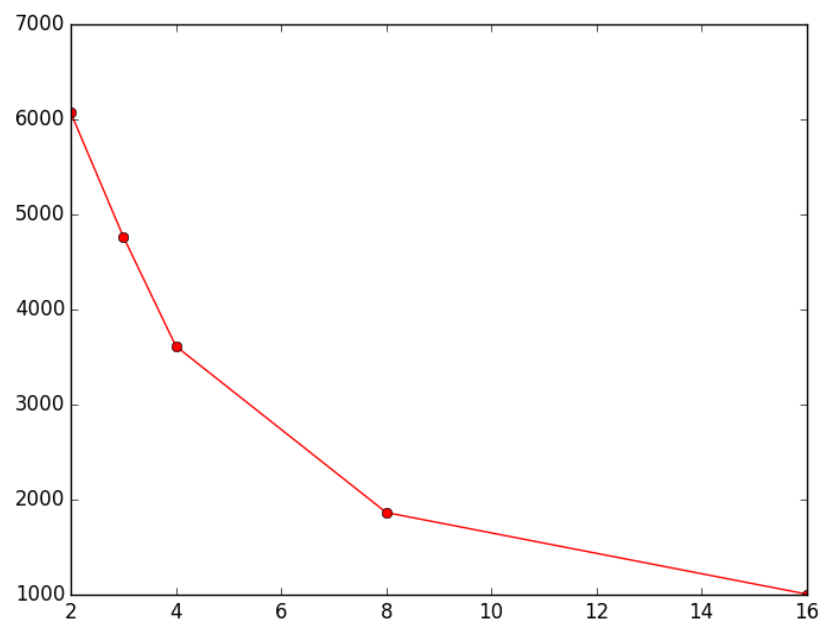




2f) plot of the averaged
pairwise distance:

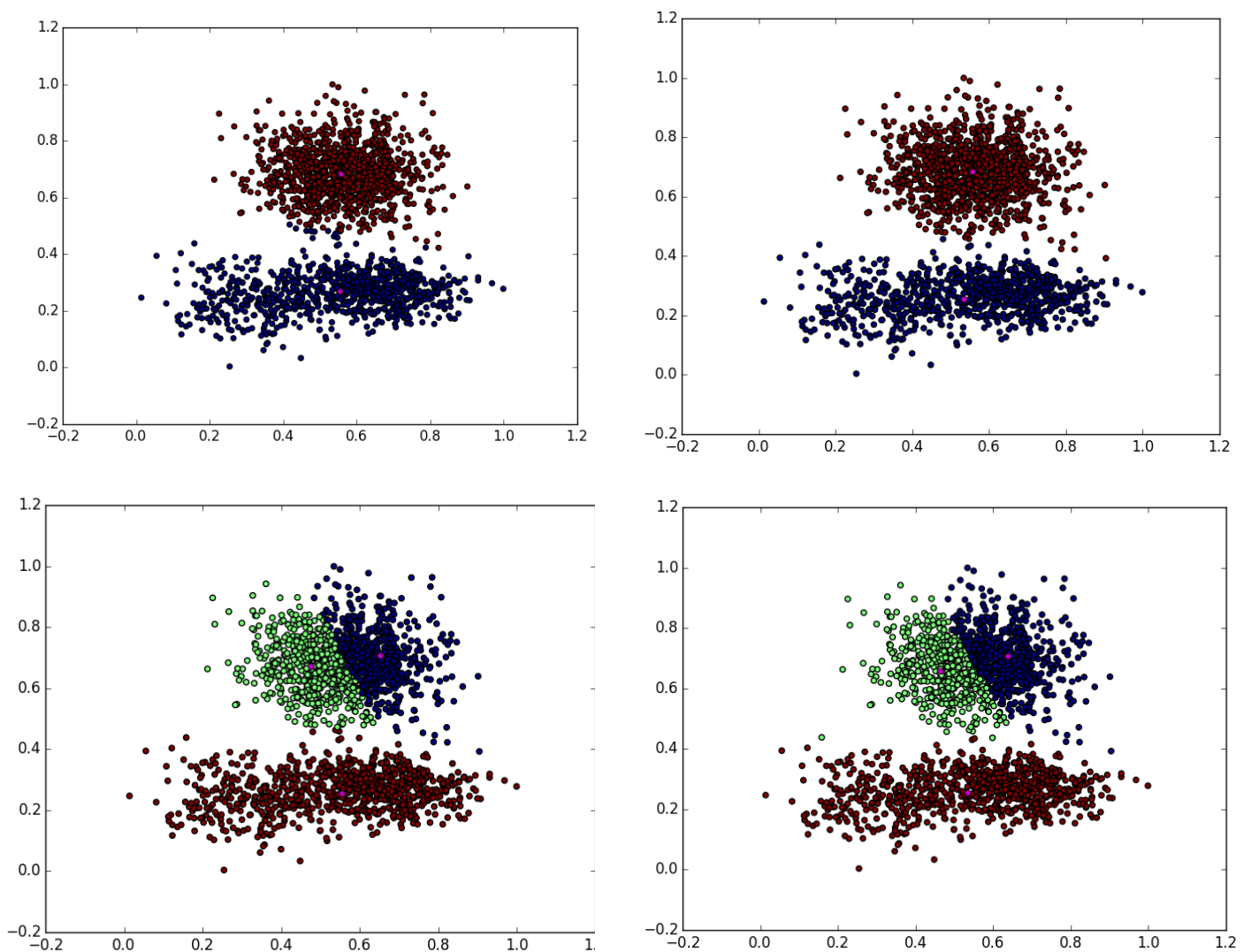


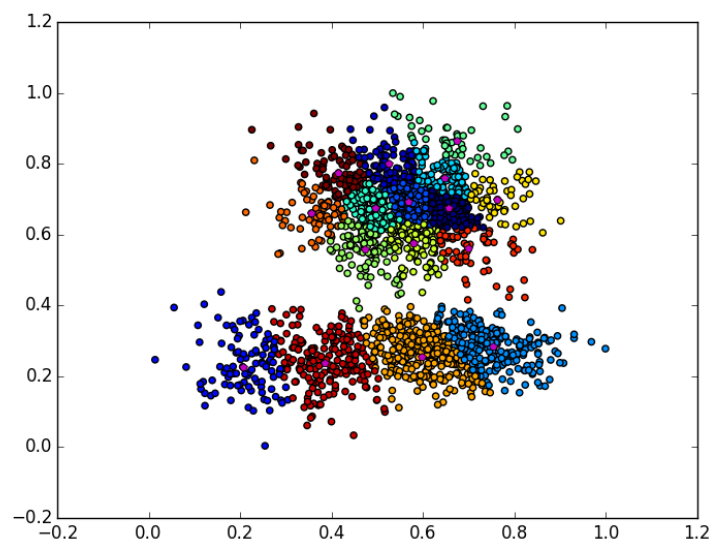
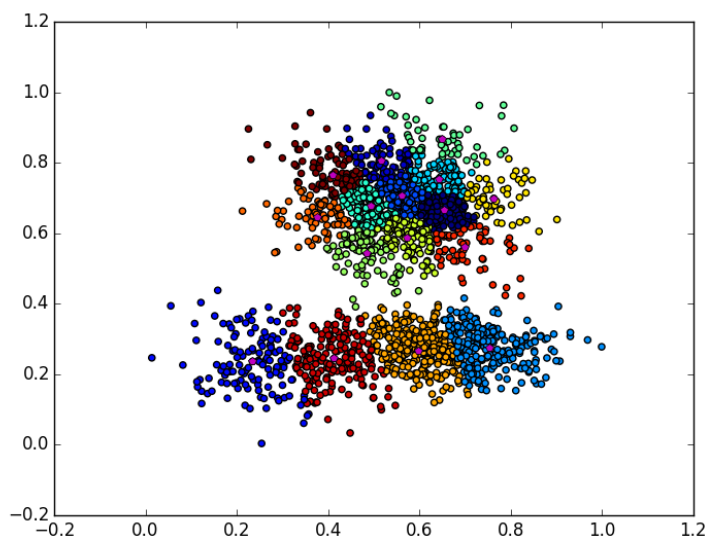
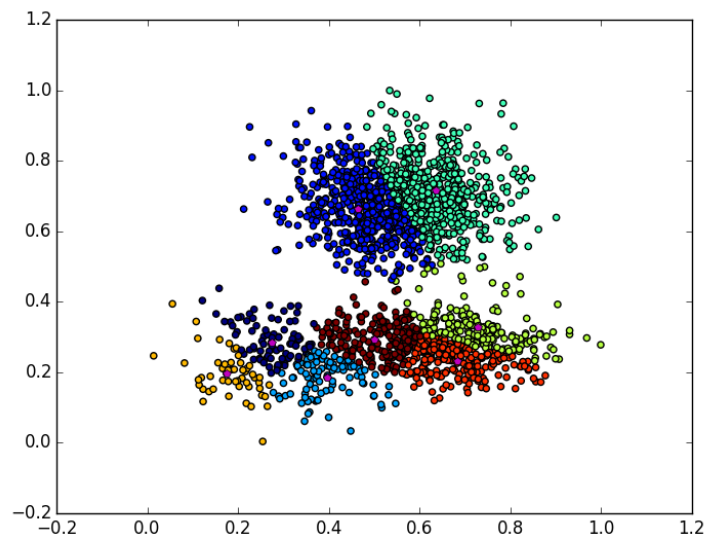
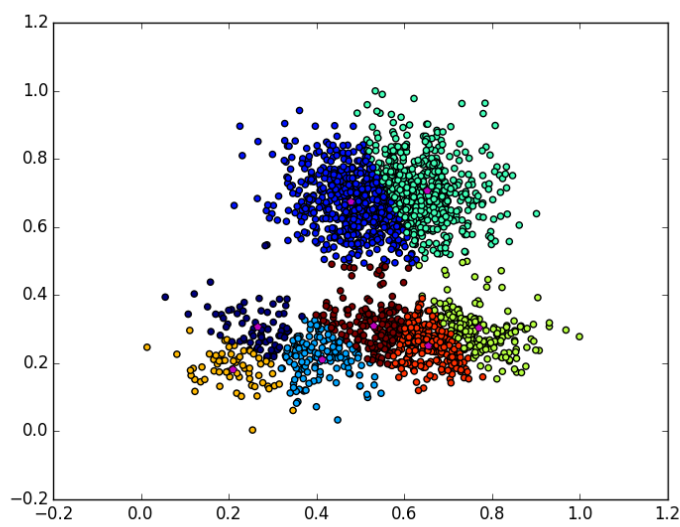
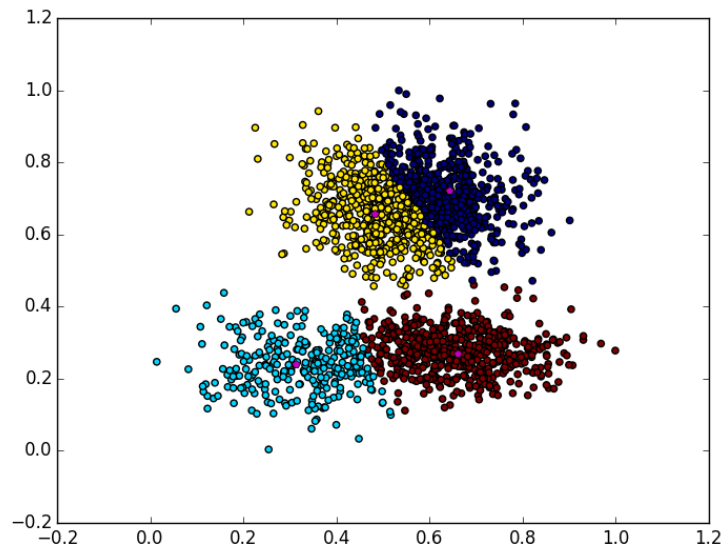
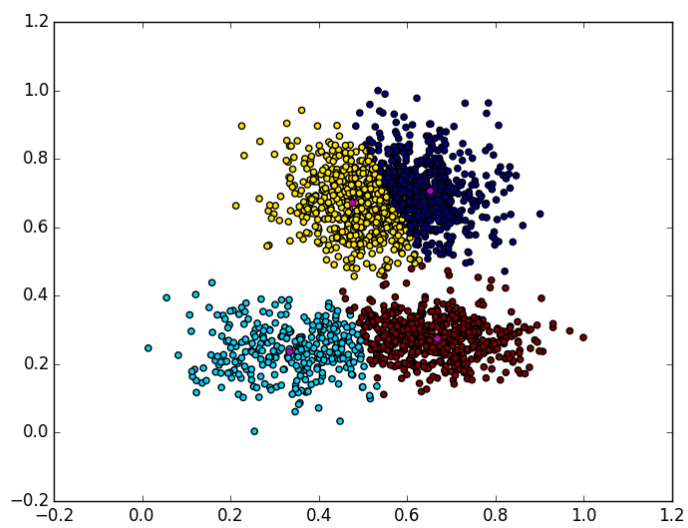
plot of the averaged
objective:



3. kmedoids

comparison between plot of clustering with euclidean distance(left) and chi-square
distance(right) with the same initial points:





4. solution $y = \frac{1}{n} \sum (x_i - z)^2$
 $-\frac{1}{n} \sum 2(x_i - z) = 0$
 $\frac{1}{n} \sum x_i = z$

5. a) $h^T A z z^T B x + x A z z^T B h$

b) $h^T A x x^T v + x^T A h x^T v + x^T A x h^T v$

c) $3 \cdot (x^T A x)^2 (h^T A x + x^T A h)$

d) $\frac{1(h^T A^T A x + x^T A^T A h)}{2\sqrt{x^T A^T A x}}$

e) the gradient is a column vector K where $K_i = \sum \frac{A_{ix}}{|A_{ix}|} A_{ih}$

where A_i is the element in the i -th row of matrix A

f) $h^T v \cos(x^{(1)}) - x^T v \sin(x^{(1)}) e_1$ where e_1 is a column vector whose first row is 1 and all other entries are 0.