Report for Homework 5

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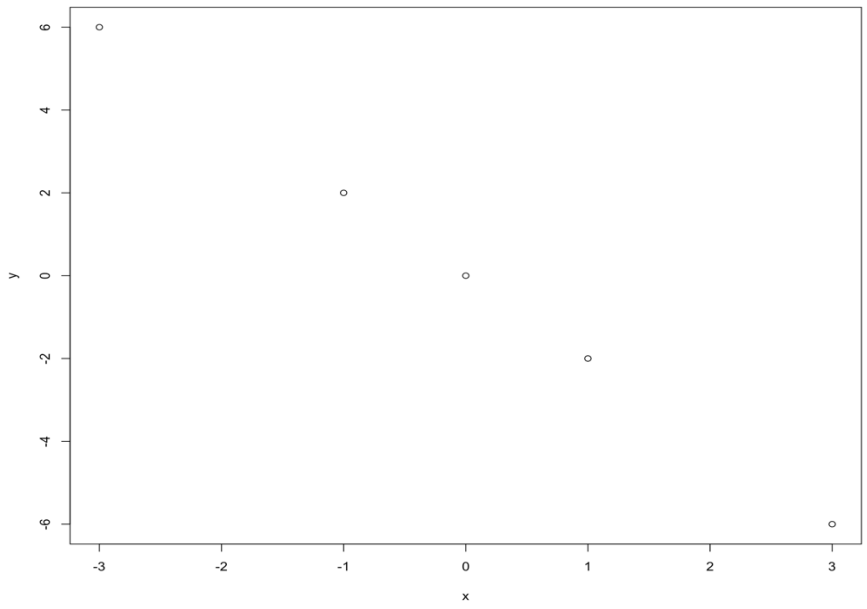
Question 1:

1. Spectral relaxation for k-means is an equivalent formulation of the sum-of-squares minimization as a trace maximization problem with special constraints; relaxing the constraints leads to a maximization problem that possesses optimal global solutions. Therefore, it works out k-means in another method to increase accuracy.
So, it' s possible to obtain exact k-means solution using spectral relaxed k-means. Spectral relaxation for k-means just transform it to another process.

2. The two method have different results with three bunch of normal distribution data with different mean. Original k-means cluster them based on mean correctly. However, Spectral relaxation k-means failed to find out the second cluster.

Question 2:

1.



First principal component: (0,sqrt(5),-sqrt(45),sqrt(5),-sqrt(45))
Second principal component: (0,0,0,0,0)

2.