

Assignment 5

Computational Intelligence, SS2020

Team Members		
Last name	First name	Matriculation Number
Blöcher	Christian	01573246
Bürgener	Max	01531577

1 Classification - 2 dimensional feature

1.1 EM algorithm

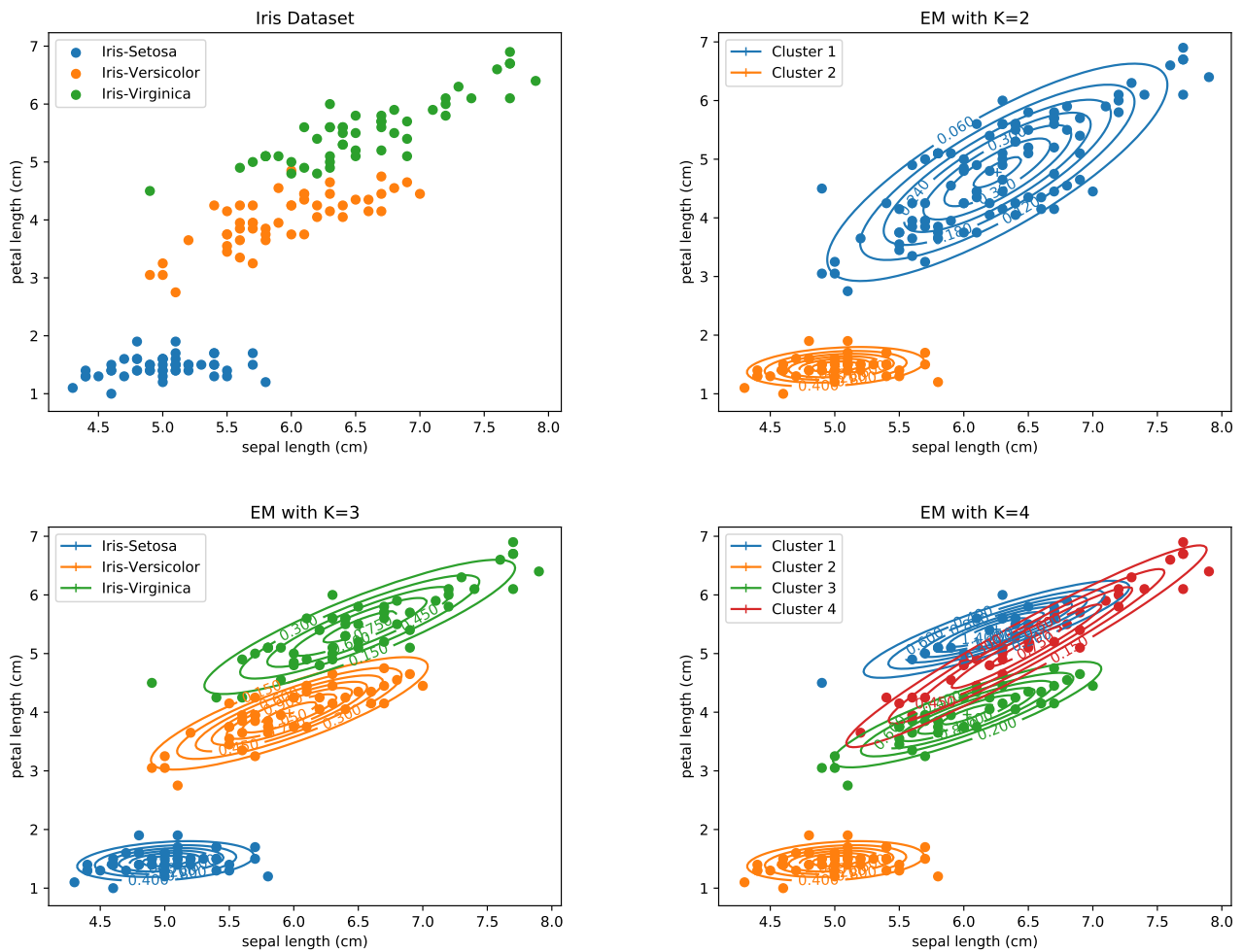


Figure 1: Results of EM classification with $K = 2 \dots 4$ components.

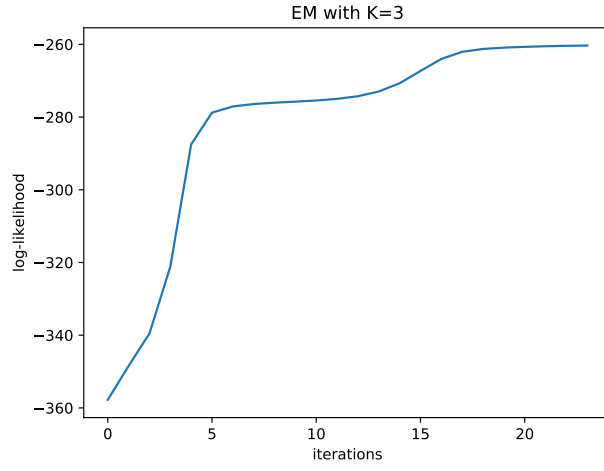


Figure 2: Log-likelihood function over iterations for $K = 3$ components.

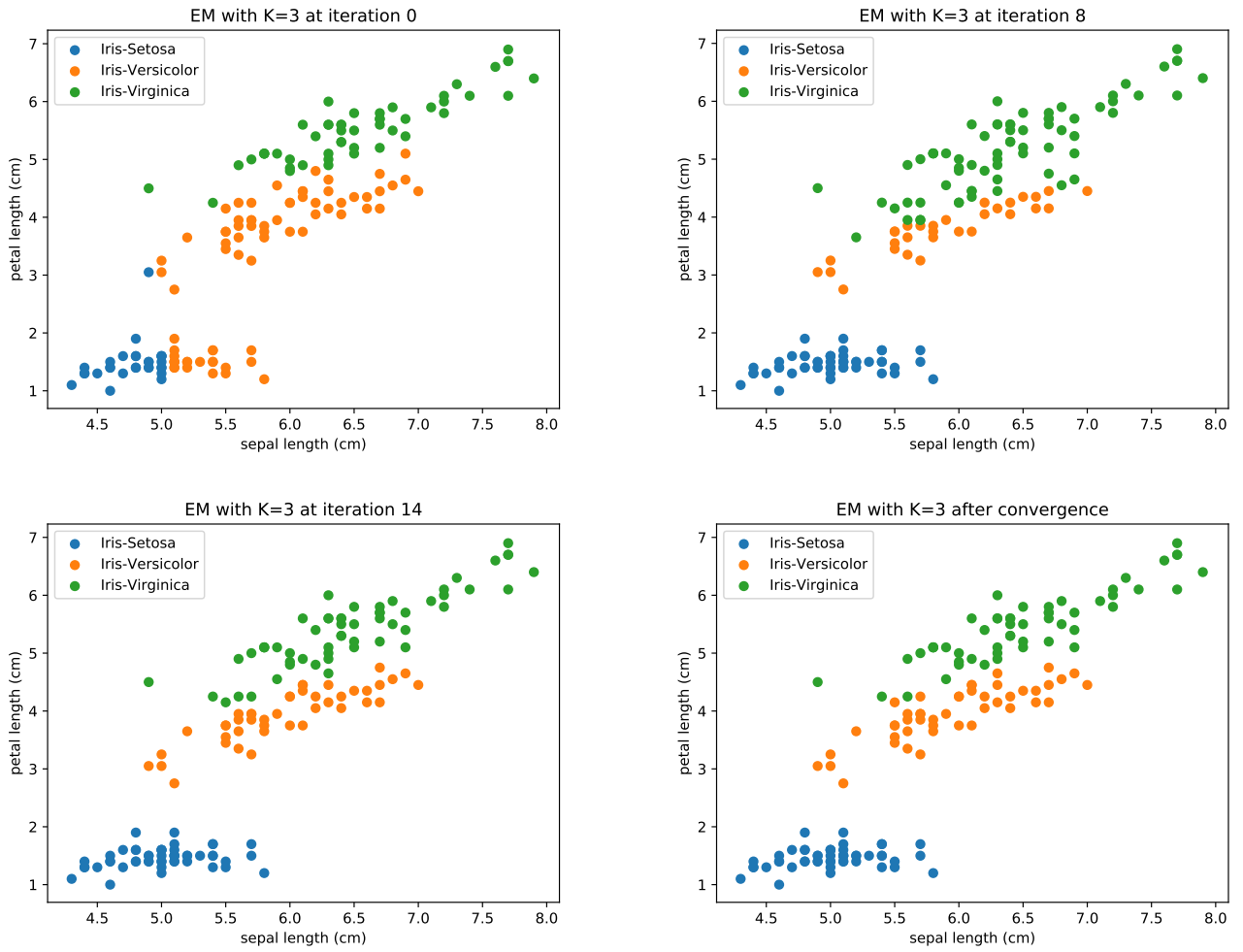


Figure 3: Results of soft-classification done in E-step.

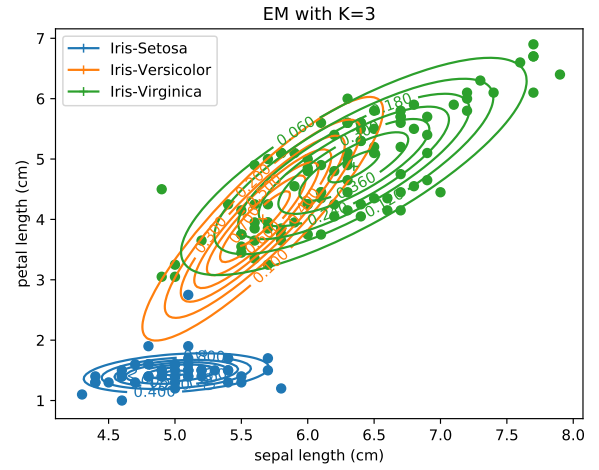
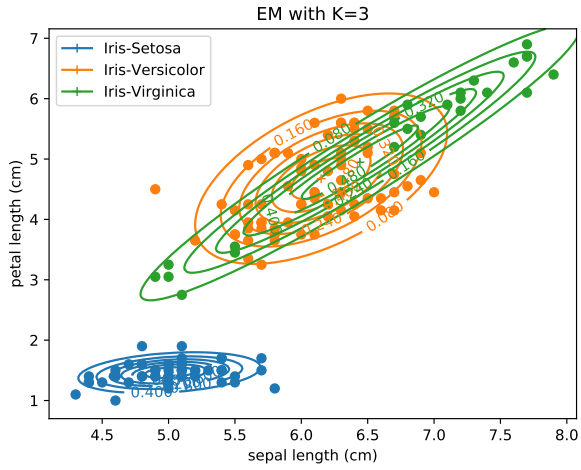
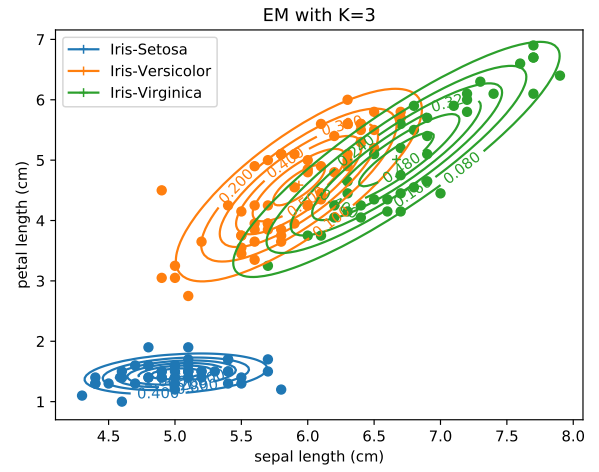
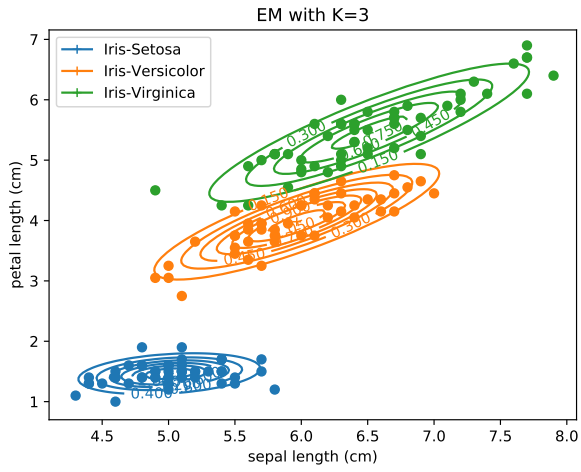


Figure 4: Results of EM classification for several random `mean0` starting samples.

1.2 K-means algorithm

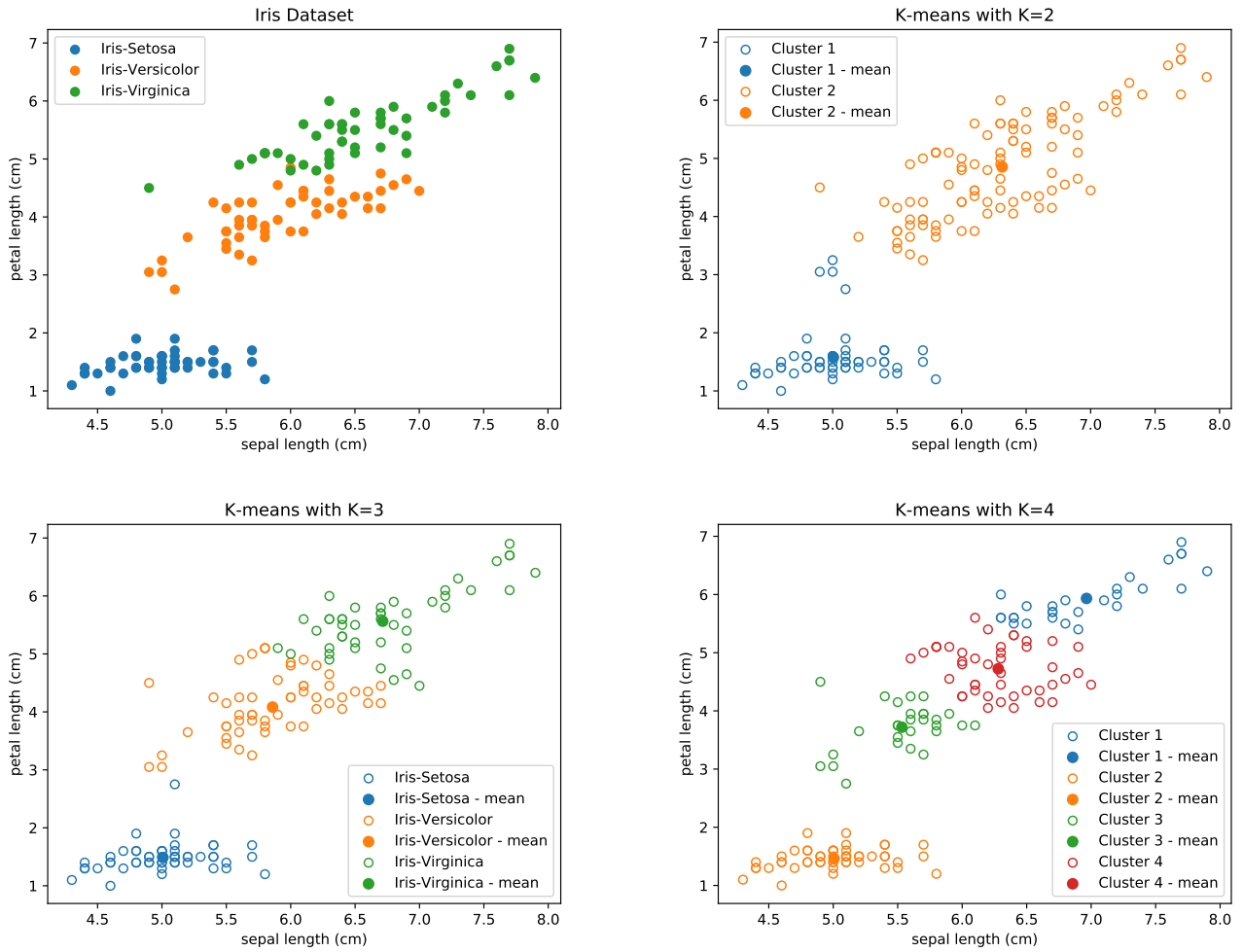


Figure 5: Results of K-means classification with $K = 2 \dots 4$ components.

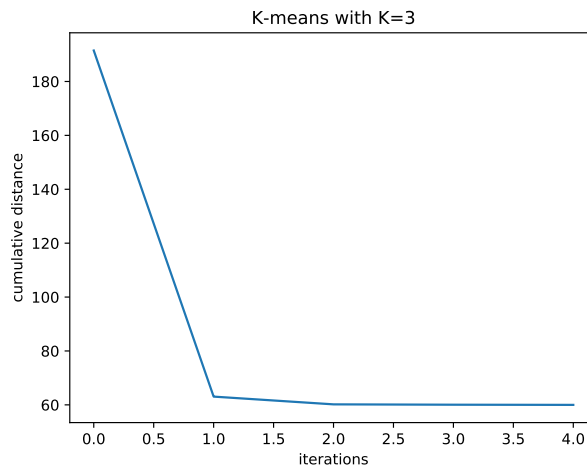


Figure 6: Cumulative distance function over iterations for $K = 3$ components.

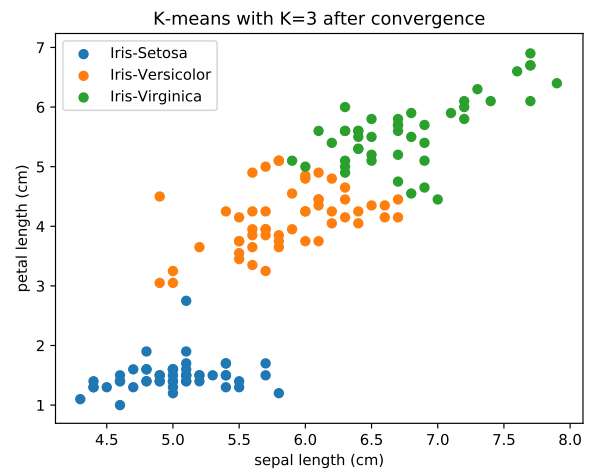
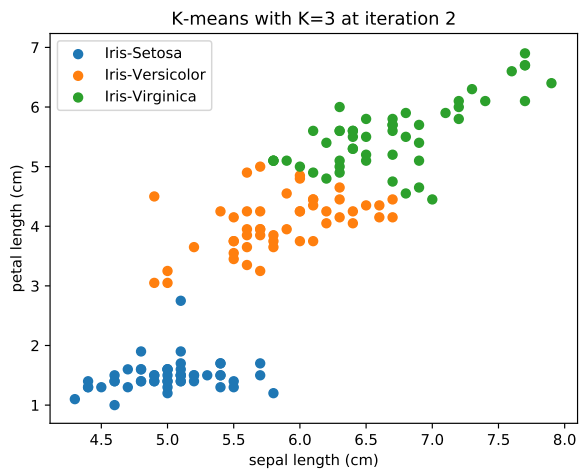
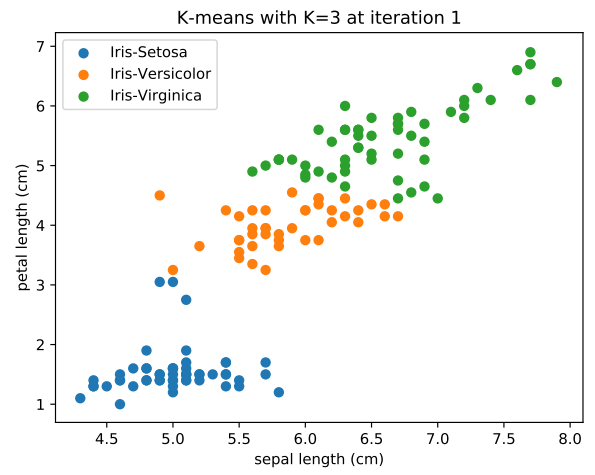
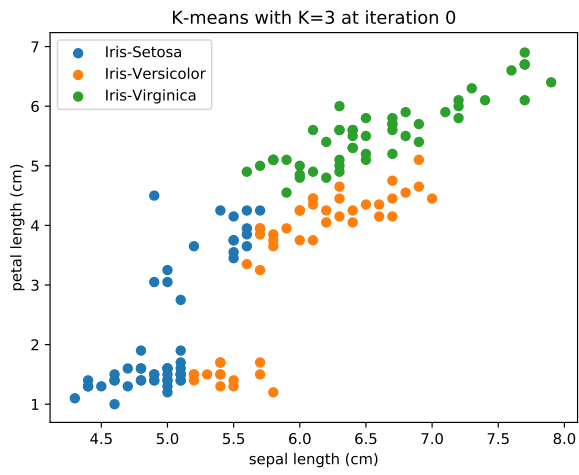


Figure 7: Results of hard-classification during optimisation.

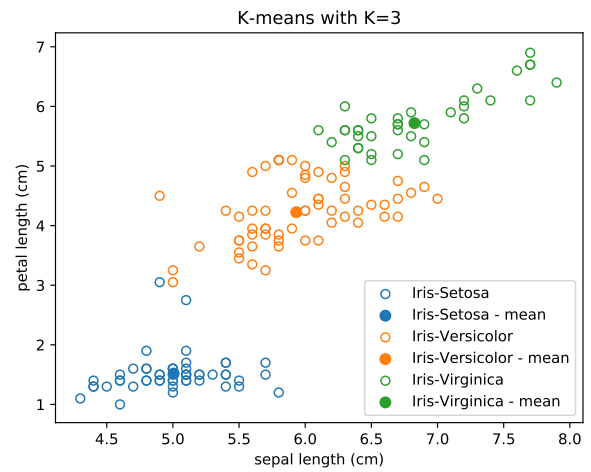
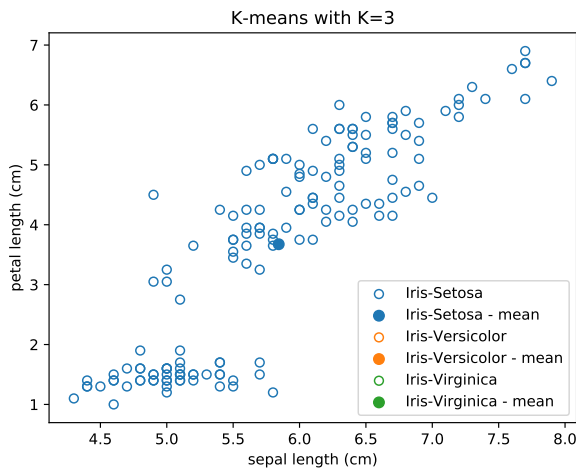
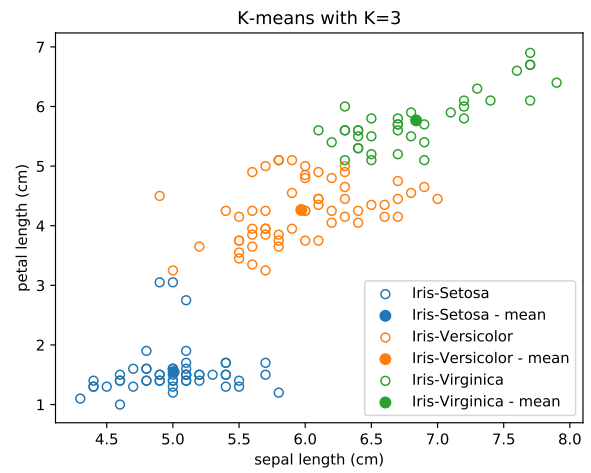
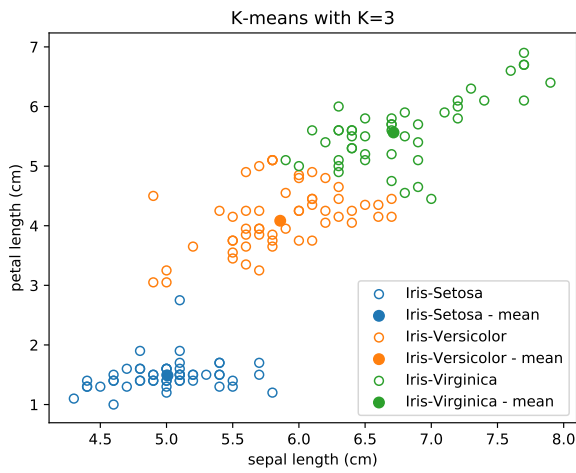


Figure 8: Results of K-means classification for several random `center0` starting samples.

2 Classification - 4 dimensional feature

2.1 EM algorithm

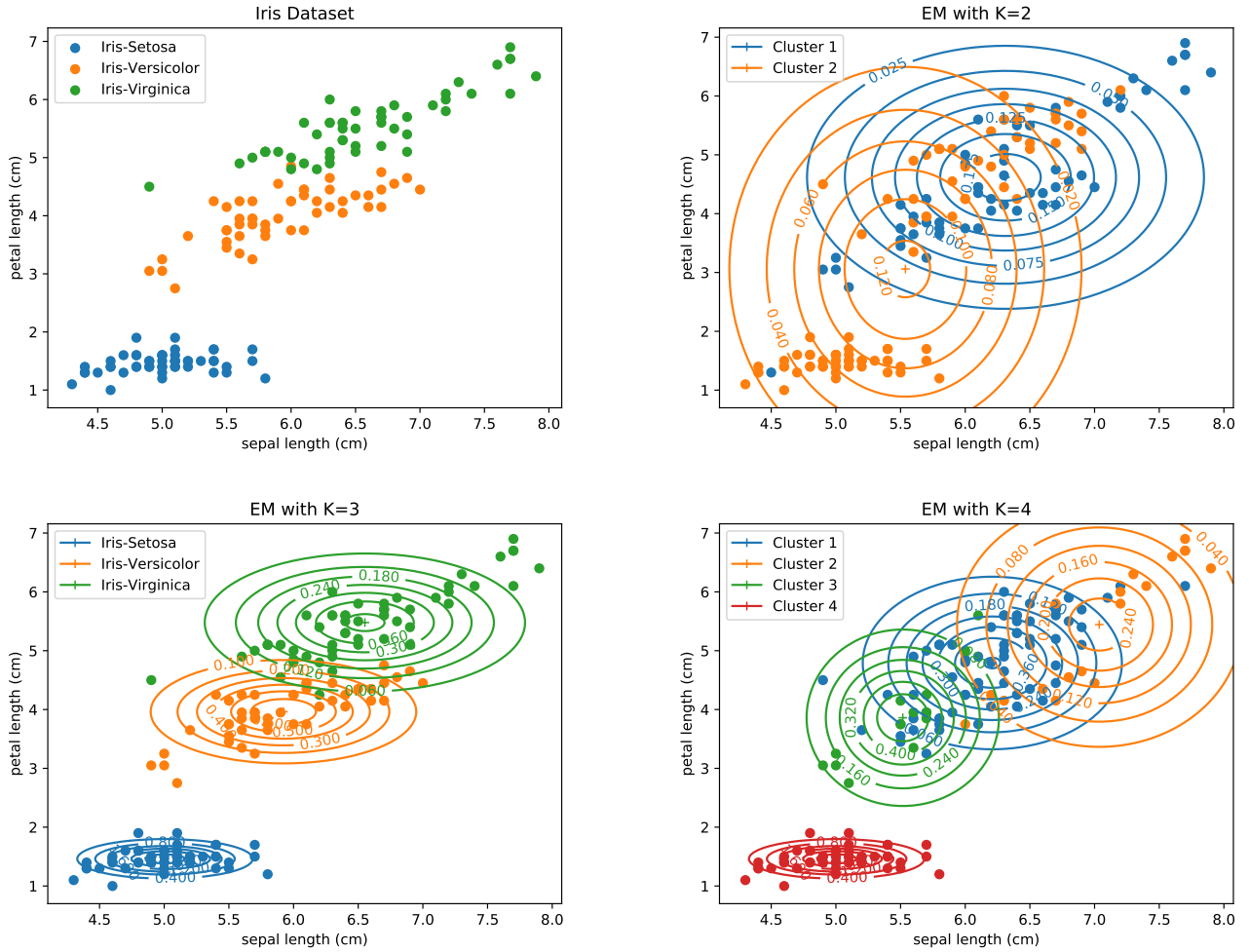


Figure 9: Results of EM classification with $K = 2 \dots 4$ components.

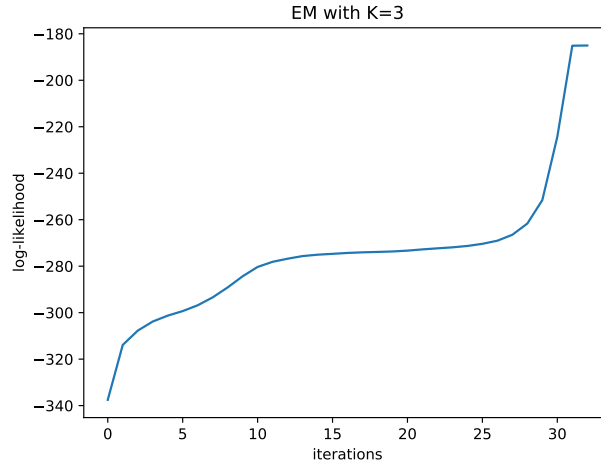


Figure 10: Log-likelihood function over iterations for $K = 3$ components.

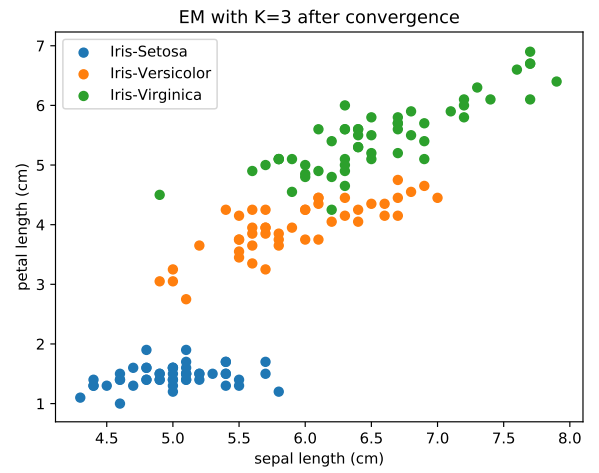
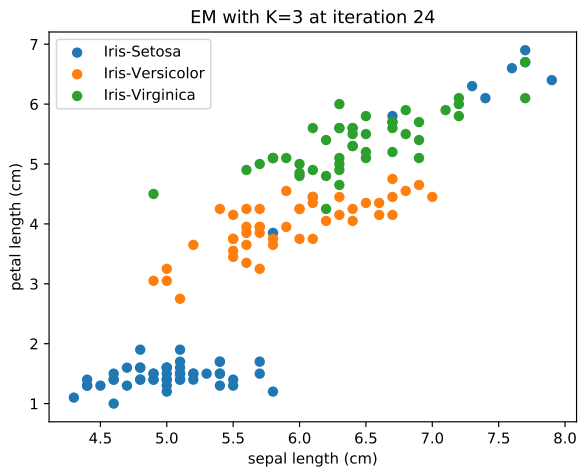
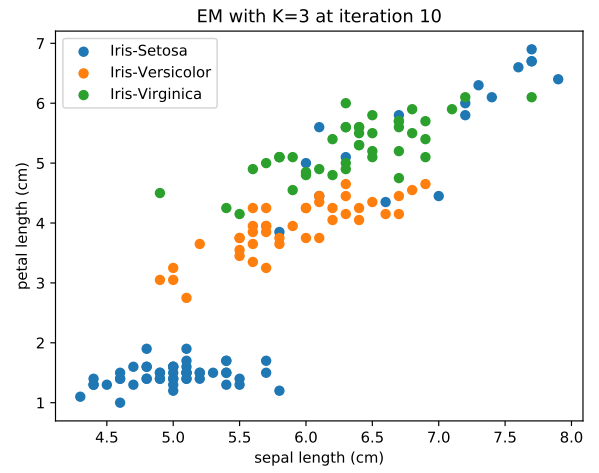
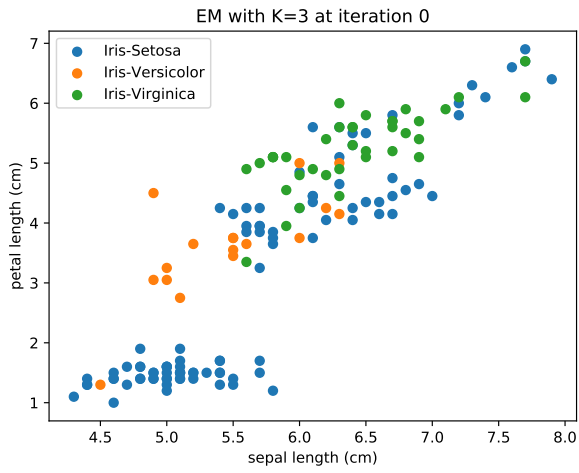


Figure 11: Results of soft-classification done in E-step.

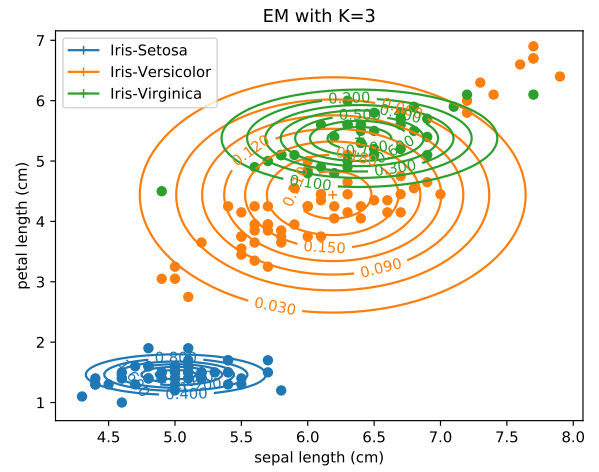
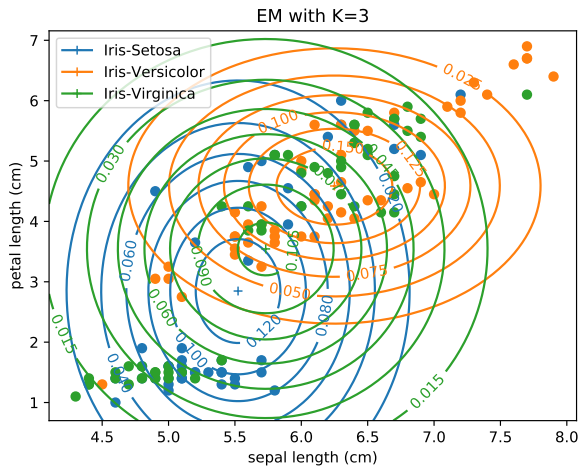
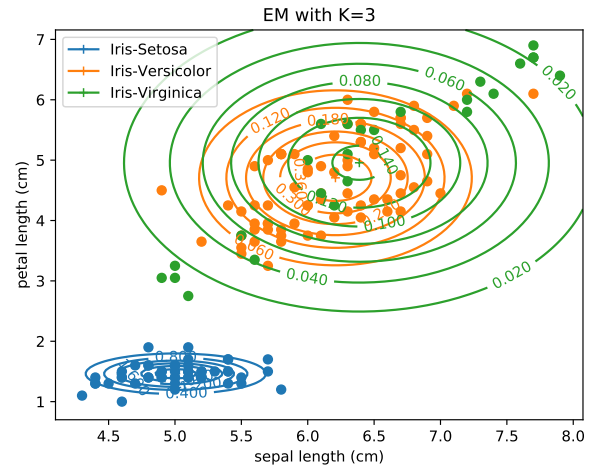
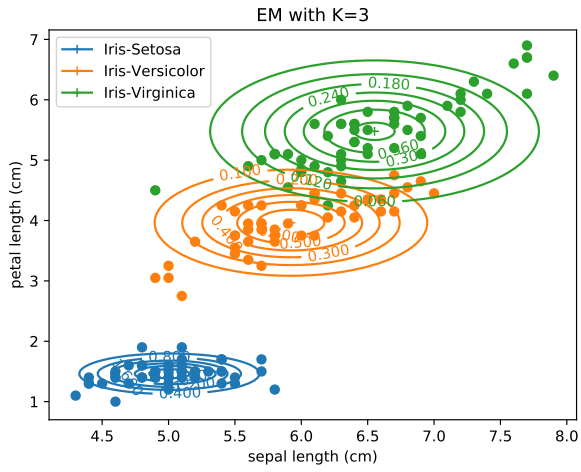
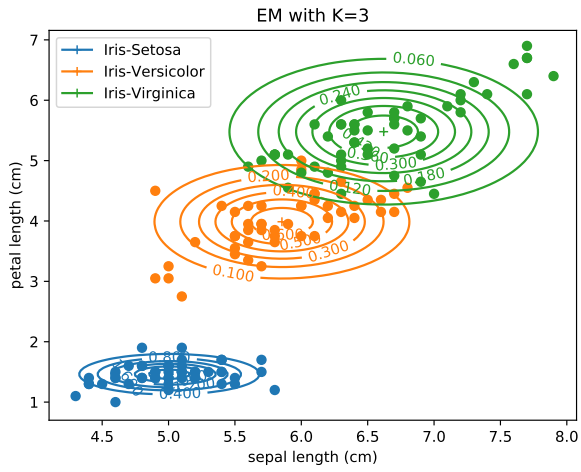
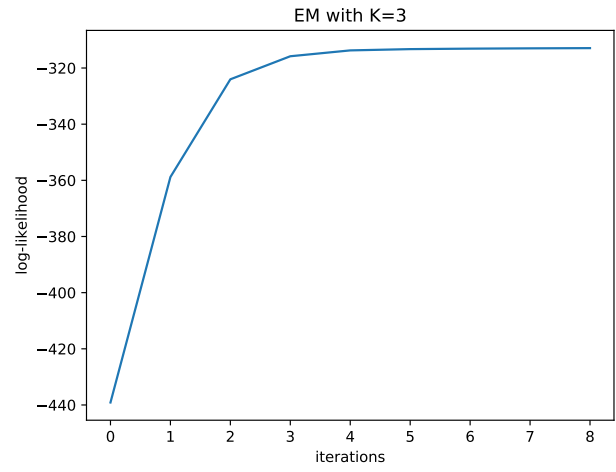


Figure 12: Results of EM classification for several random `mean0` starting samples.

2.2 EM algorithm with diagonal covariance matrices



(a) Results of classification



(b) Log-likelihood

Figure 13: Results of EM classification with diagonal covariance matrices.

2.3 K-means algorithm

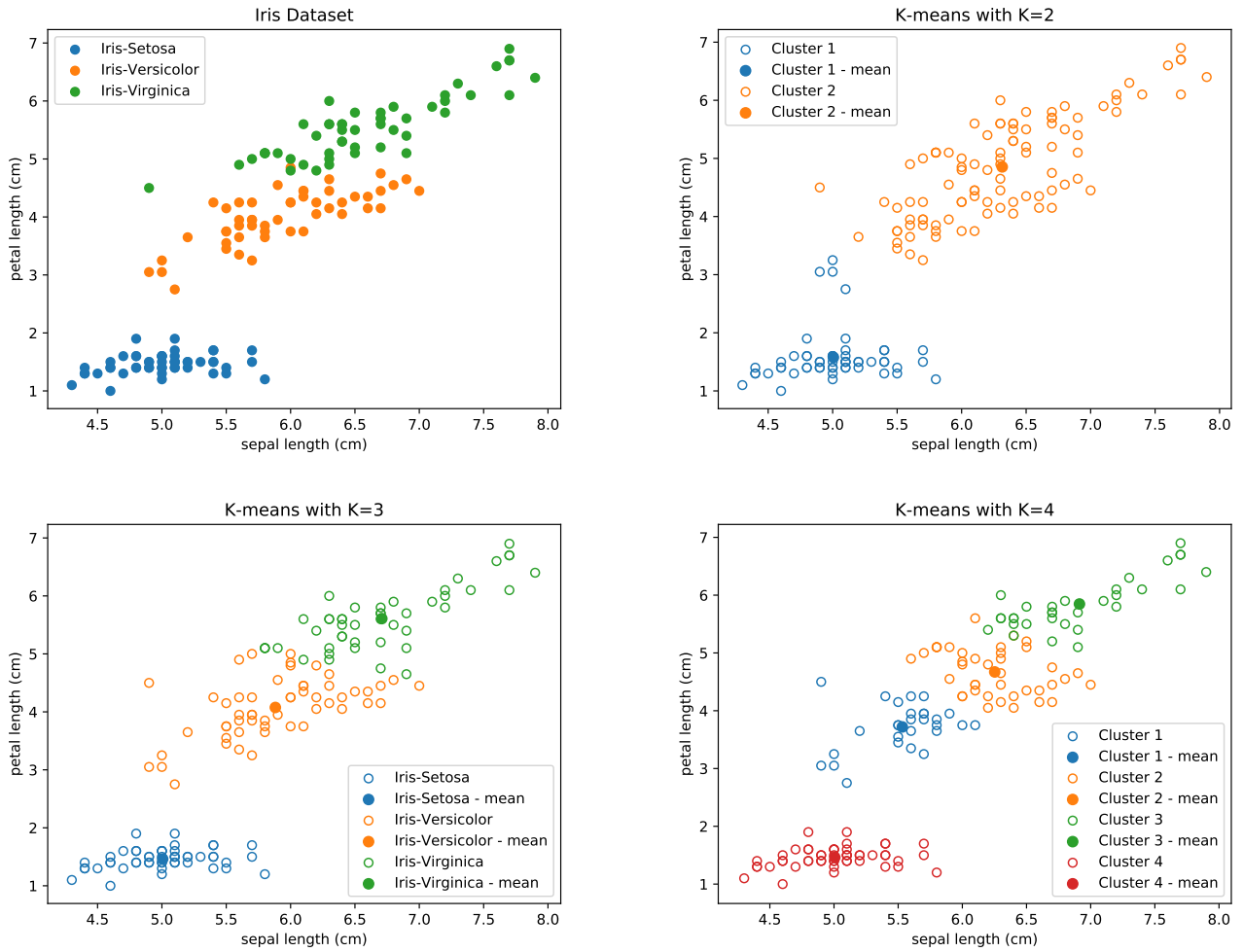


Figure 14: Results of K-means classification with $K = 2 \dots 4$ components.

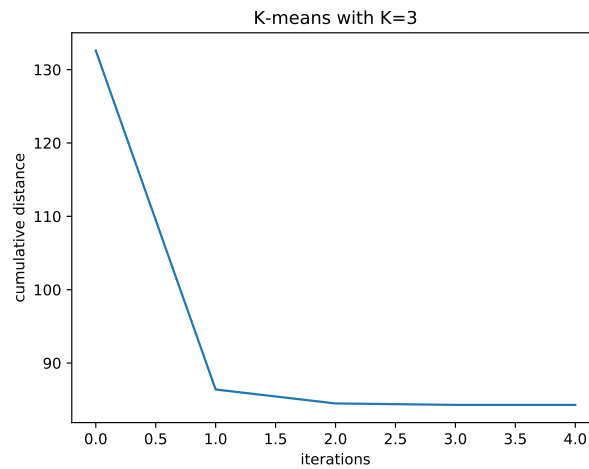


Figure 15: Cumulative distance function over iterations for $K = 3$ components.

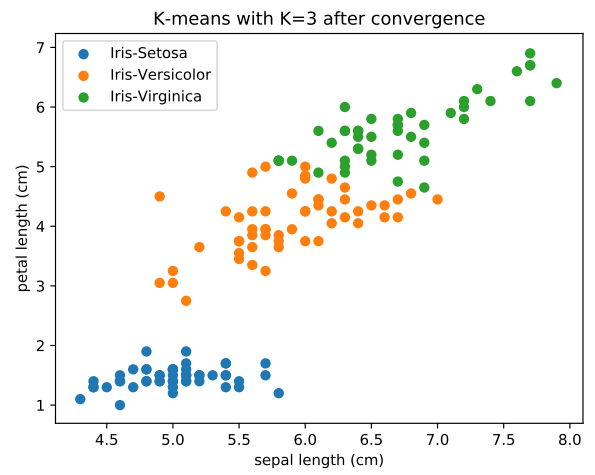
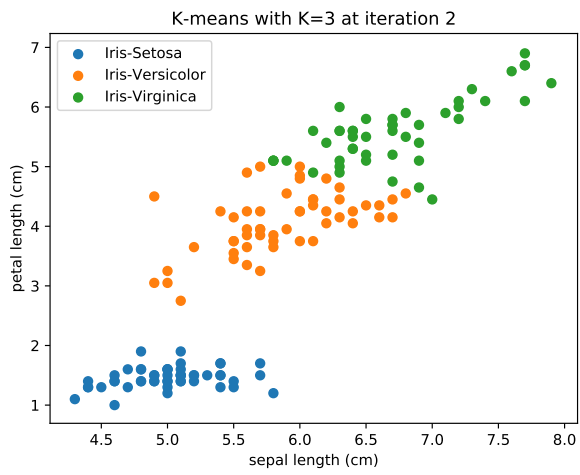
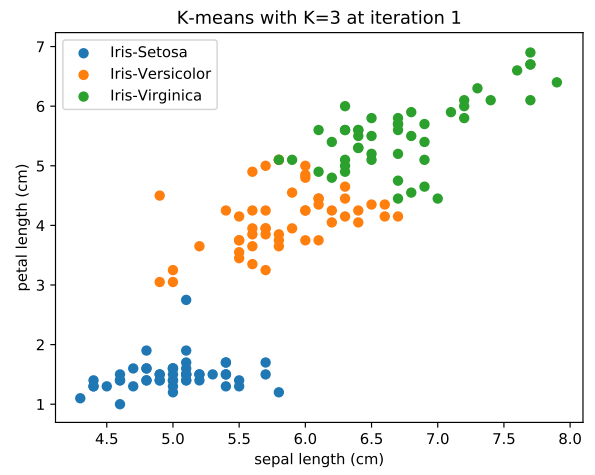
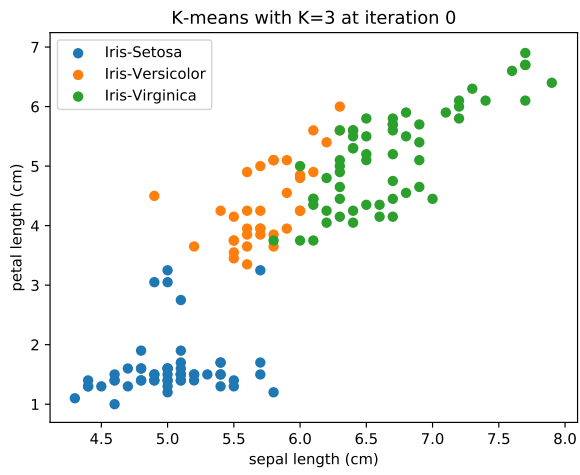


Figure 16: Results of hard-classification during optimisation.

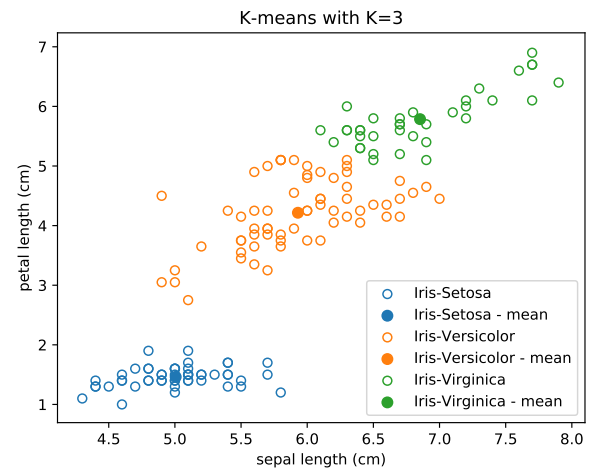
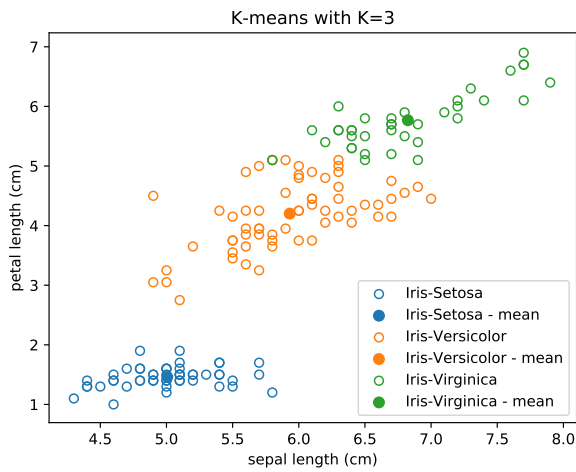
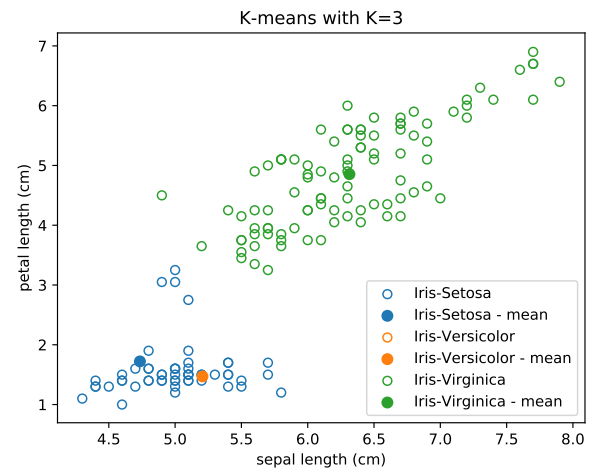
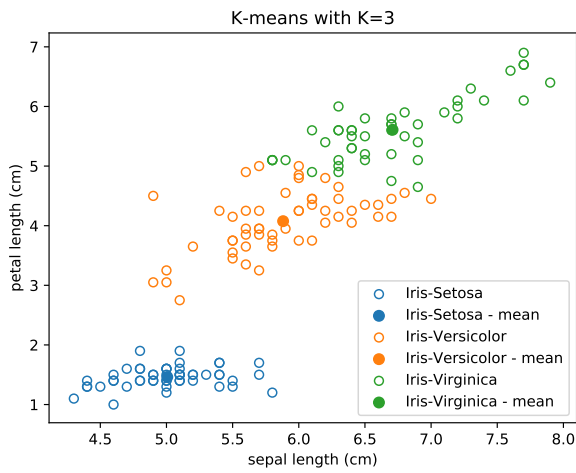


Figure 17: Results of K-means classification for several random `center0` starting samples.