1. (True/False) k-means always converges to a local optimum. 1 point

- (●) True
- ( ) False

2. (True/False) The clustering objective is non-increasing throughout a run of k-means. 1 point

- (●) True
- ( ) False

3. (True/False) Running k-means with a larger value of k always enables a lower possible final objective value than running k-means with smaller k. 1 point

- (●) True
- ( ) False

4. (True/False) Any initialization of the centroids in k-means is just as good as any other. 1 point

- ( ) True
- (●) False

5. (True/False) Initializing centroids using k-means++ guarantees convergence to a global optimum. 1 point

- ( ) True
- (●) False

6. (True/False) Initializing centroids using k-means++ costs more than random initialization in the beginning, but can pay off eventually by speeding up convergence. 1 point

- (●) True
- ( ) False

7. (True/False) Using k-means++ can only influence the number of iterations to convergence, not the quality of the final assignments (i.e., objective value at convergence). 1 point

- ○ True
- ◉ False

8. Consider the following dataset: 4 points

	X1	X2
Data point 1	-1.88	2.05
Data point 2	-0.71	0.42
Data point 3	2.41	-0.67
Data point 4	1.85	-3.80
Data point 5	-3.69	-1.33

Perform k-means with k=2 until the cluster assignment does not change between successive iterations. Use the following initialization for the centroids:

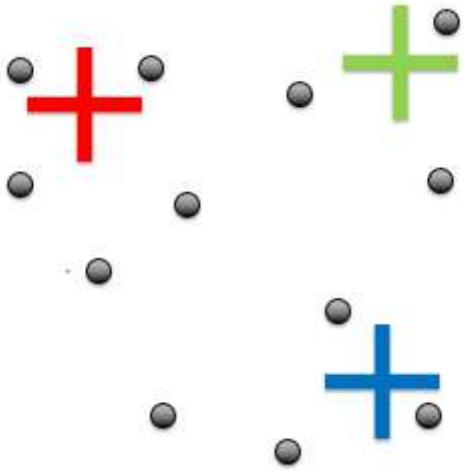
	X1	X2
Cluster 1	2.00	2.00
Cluster 2	-2.00	-2.00

Which of the five data points changed its cluster assignment most often during the k-means run?

- ○ Data point 1
- ◉ Data point 2
- ○ Data point 3
- ○ Data point 4
- ○ Data point 5

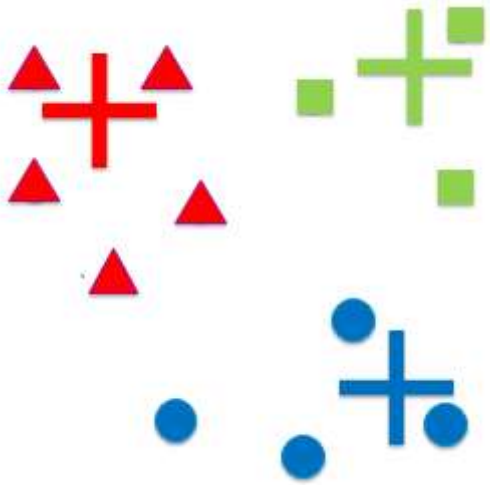
9. 1 point

Suppose we initialize k-means with the following centroids



Which of the following best describes the cluster assignment in the first iteration of k-means?

◉



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