



## ✓ Congratulations! You passed!

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point

1. (True/False) While the EM algorithm maintains uncertainty about the cluster assignment for each observation via soft assignments, the model assumes that every observation comes from only one cluster.

1 / 1  
point

2. (True/False) In high dimensions, the EM algorithm runs the risk of setting cluster variances to zero.

1 / 1  
point

3. In the EM algorithm, what do the E step and M step represent, respectively?

1 / 1  
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4. Suppose we have data that come from a mixture of 6 Gaussians (i.e., that is the true data structure). Which model would we expect to have the highest log-likelihood after fitting via the EM algorithm?

0 / 1  
point

5. Which of the following correctly describes the differences between EM for mixtures of Gaussians and k-means? Choose all that apply.

1 / 1  
point

6. Suppose we are running the EM algorithm. After an E-step, we obtain the following responsibility matrix:

Cluster responsibilities	Cluster A	Cluster B	Cluster C
Data point 1	0.20	0.40	0.40
Data point 2	0.50	0.10	0.40
Data point 3	0.70	0.20	0.10

Which is the **most probable** cluster for data point 3?

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point

7. Suppose we are running the EM algorithm. After an E-step, we obtain the following responsibility matrix:

Cluster responsibilities	Cluster A	Cluster B	Cluster C
Data point 1	0.20	0.40	0.40
Data point 2	0.50	0.10	0.40
Data point 3	0.70	0.20	0.10

Suppose also that the data points are as follows:

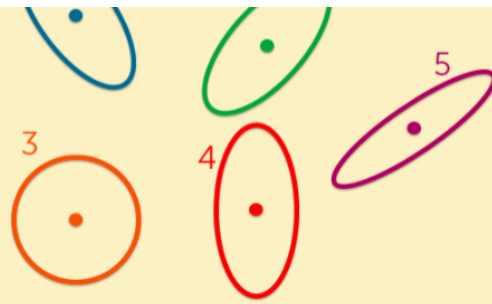
Dataset	X	Y	Z
Data point 1	3	1	2
Data point 2	0	0	3
Data point 3	1	3	7

Let us compute the new mean for Cluster A. What is the **Z coordinate** of the new mean? Round your answer to 3 decimal places.

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point

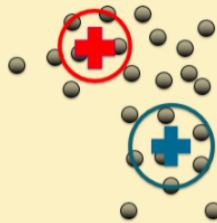
8. Which of the following contour plots describes a Gaussian distribution with diagonal covariance? Choose all that apply.





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points

9. Suppose we initialize EM for mixtures of Gaussians (using full covariance matrices) with the following clusters:



Which of the following best describes the updated clusters after the first iteration of EM?