# Homework 11

Instructions

This homework contains **2** concepts and **5** programming questions. In MS word or a similar text editor, write down the problem number and your answer for each problem. Combine all answers for concept questions in a single PDF file. Export/print the Jupyter notebook as a PDF file including the code you implemented and the outputs of the program. Make sure all plots and outputs are visible in the PDF.

Combine all answers into a single PDF named andrewID_hw11.pdf and submit it to Gradescope before the due date. Refer to the syllabus for late homework policy. Please assign each question a page by using the "Assign Questions and Pages" feature in Gradescope.

Here is a breakdown of the points for programming questions:

Name	Points
Concept 1	8
Concept 2	4
M11-L1-P1	9
M11-L1-P2	9
M11-L1-P3	9
M11-L2-P1	9
M11-HW1	72
Total	**120**
Bonus	6

Problem 1
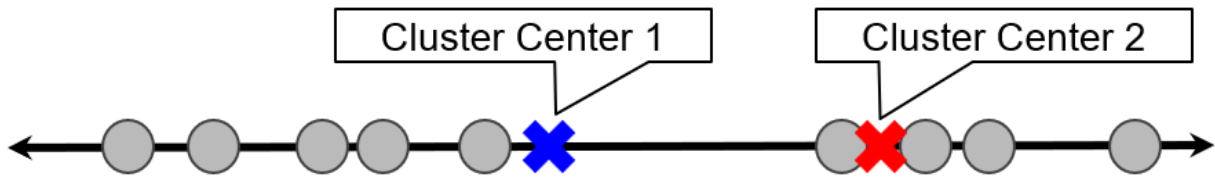
We have randomly placed two cluster centers amongst the data above to initialize the K-Means algorithm.

Q1: Now we will assign a cluster to each of the data points, based which centroid they are closest to. How many points are assigned to each cluster center. (Text Entry)

Q2: Now that we have assigned clusters to each of the data points, we will proceed to the next iteration of K-Means and move the cluster centers to the centroid of their data points. Which direction will each of the cluster centers 1 and 2 move, respectively? (Multiple Choice)

1. Left, Left
2. Left, Right
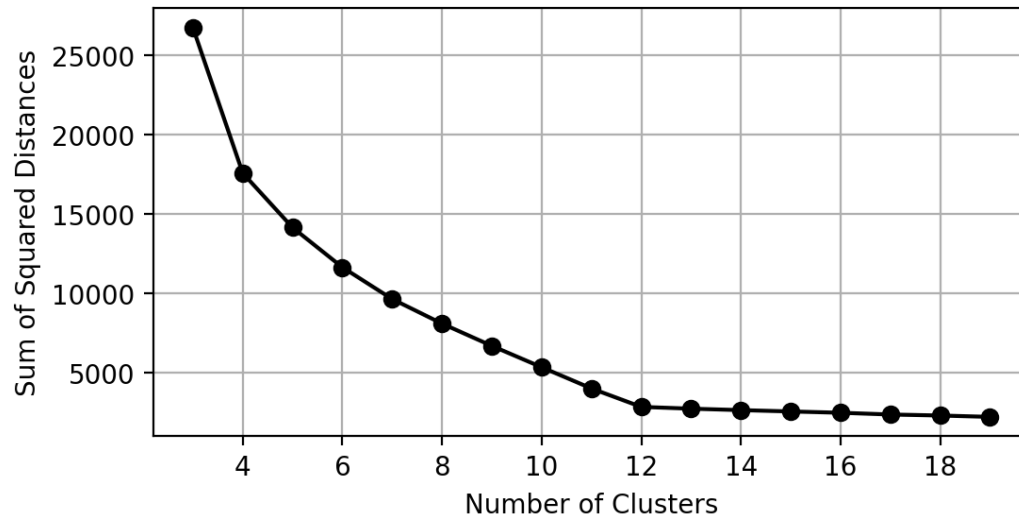3. Right, Left
4. Right, Right

Q1: 5 for cluster 1, 4 for cluster 2.

Q2: 2

Problem 2 (4 Points)

Consider the following elbow method plot generated using the K-Means algorithm. What is the natural number of clusters for this dataset?
(Text Entry)

12 is the natural number of clusters