Question 1: Linear Regression on a Cosine Function

Given the following points (t, y):
(1, 2.4), (2, 1.3), (3, -0.5), (4, 1.6), (5, 2.8)

Use linear regression to fit the function:

$$y = w_0 + w_1 \cos(2t) + w_2 \cos(5t)$$

Determine the values of w_0, w_1, w_2.

Question 2: kNN Classification

Given the data points and their labels:

[(2,3), A], [(4,2), B], [(1,1), A], [(5,4), B], [(3,2), A], [(6,5), B], [(5,2), B], [(2,4), A], [(3,5), A], [(4,4), B]

Predict the label for a new point (4,3) when k=1 and k=3.

- For Python, the key library is `sklearn.neighbors` with the main function being `KNeighborsClassifier`.
- For MATLAB, the main function for kNN is `fitcknn`.

Question 3: SVM Classification

Using 10 2D points and their labels, determine the support vectors using SVM and provide the decision rule.
Given the data points and their labels:
X = [[2,3], [4,2], [1,1], [5,4], [3,2], [6,5], [5,2], [2,4], [3,5], [4,4]]
y = ['A', 'B', 'A', 'B', 'A', 'B', 'B', 'A', 'A', 'B']

- For Python, you can retrieve w_1, w_2 using `clf.coef_` and b using `clf.intercept_` after training your SVM.
- For MATLAB, after fitting your SVM model, you can retrieve the coefficients using `SVMModel.Beta` and the intercept with `SVMModel.Bias`.