Data Mining	**Fall 2021**
Tu,Th 2:00 PM -3:15 PM	**HW 5 UG**

Chapter 4

Fisher LDA [5 pts] Given the following data points:

#	Data points (A_1, A_2)	Class
1	(4,2.9)	1
2	(3.6,4)	1
3	(2.5,1)	0
4	(2,2.15)	0

- [1 pt] Compute means μ_1 and μ_0, and the between-class scatter matrix S_B
- [1 pt] Compute SC_1 and SC_0, the within-class scatter matrices and their sum S_W
- [1 pt] Find the optimal vector $\overline{w}$ that discriminates between the classes
- [1 pt] Having found discriminant vector $\overline{w}$, find the point on $\overline{w}$ that best separates the two classes.
- [1 pt] Classify the point $(3.8, 5)$

Perceptron [3 pts] . Apply the perceptron learning algorithm for the following pattern set until convergence. Start with 0-weight vector

$$\overline{w} = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

For simplicity of computation use $\eta = 1$. Apply the learning algorithm to data points in the given order cyclically. For each step of perceptron learning write down the classification result of a data point with the current weight vector, indicator if update is needed, and computation of vector update if necessary. The dataset consist of datapoints a, b, c, d:

	X_1	X_2	X_3	Y
$a.$	4	3	6	-1
$b.$	2	-2	3	1
$c.$	1	0	-3	1
$d.$	4	2	3	-1