İstanbul Bilgi University

Department of Computer Engineering

SPRING, 2022

Campus: Santral

CMPE 407
MACHINE LEARNING

HW on K-NN

(Duration: minutes)

Name :

Student ID :

Make sure that you explain in detail all your steps - thoughts. You may get extra points for an appropriate observation, you may lose some marks due to an obscure solution.

1. {20 points} Your training set is made up of the following 2-dimensional points: A=$\{a^1, a^2, a^3, a^4, a^5\}$ = {(1,0), (1,3), (3,0), (0,-2), (-2,0)}, where a^1, a^2, and a^3 belong to class 1, and a^4, a^5 to class 2.

(a) Plot all samples into a 2-dimensional Cartesian axis system

(b) {10 points} Calculate the Manhattan distance [1] between the test sample b=(0,0) and every a^i of the training set

(c) {5 points} Use the K- Nearest Neighbor algorithm with K=1 to assign a class to 'b'. Explain

(d) {5 points} Classify 'b' using K=5. Explain

[1] Manhattan(a, b) = $\sum_i |a^i - b^i|, \forall i = 1, 2$