

The objective of this homework is to test your understanding of the module 9 and Lab-5 lecture video. Due date of the homework is: **Monday, November 23, 2020**. You have to upload a scanned version of your solutions on Blackboard. If you don't have a scanner around you, you can use Cam Scanner—a mobile app that scans images in a neat way, as if they're scanned through a copier.

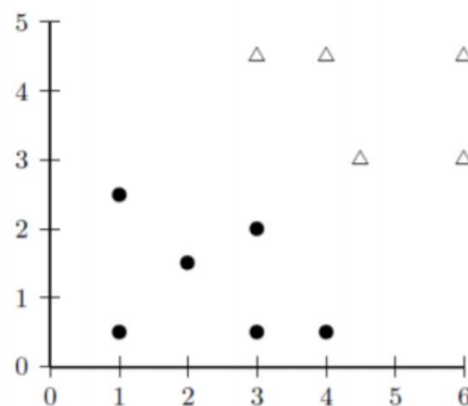
For questions related to the homework, please email the two teaching assistants: (a) Wasim (email: wasim.dipon@my.utsa.edu) and (b) Yuvaraj (email: yuvaraj.munian@my.utsa.edu).

You can send your question to both of them on the same email. Feel free to CC me as well, but that is not necessary.

1. A well pump is run at a series of different pumping rates to test aquifer response. Each pumping rate produces a different water level in a nearby monitoring well.
 - a. Using linear regression and data below, determine the relationship between pumping rate and H at the nearby well.
 - b. Based on the relationship you found in a, what pumping rate would produce an H value of 224ft? [Hint: Refer the table]

Pumping rate (gal/day) (x)	0	152	602	1052	1502	1952
Hydraulic Head (feet) (y)	390.40	372.50	316.41	266.42	213.47	160.51

2. Assume that a support vector machine (SVM) is used to classify the data samples depicted in the figure below,



Find the linear SVM that separates optimally the two classes by maximizing the margins. Explain in detail how the support vectors are determined. Write down the expressions of the support vectors.