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# Assignment 2

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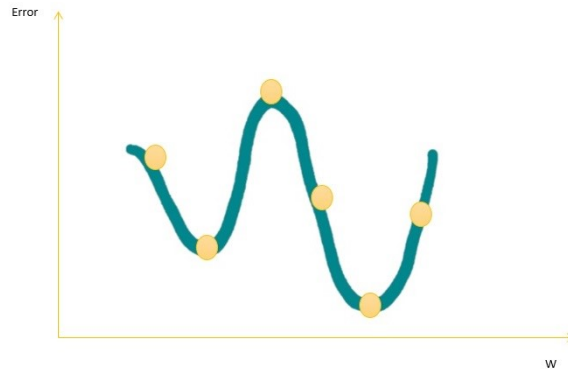
Neural Networks : Fall 1400 : Dr. Mozayani  
Due Saturday, Aban 29, 1400

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## Problem 1

1- According to the figure, answer the following questions.



(a)

Draw the slope at the specified points and explain how the weight should change to reach the Global minimum position (according to SGD) at each point.

(b)

What are points number 2 and 3 called? (The points are numbered from left to right.)

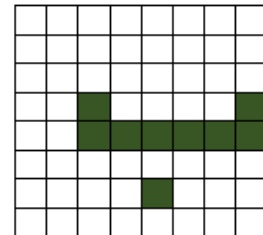
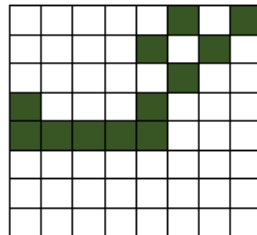
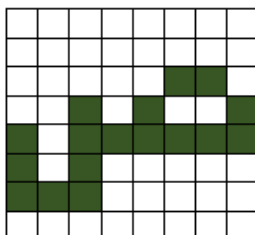
Since the slope is zero in these points, the optimizer may get stuck in such positions. Suggest a solution to this problem.

## Problem 2

In neural networks, both shallow and deep networks can be used to approximate the performance of functions. Explain how these networks can estimate the best. Moreover, please define shallow and deep neural networks.

## Problem 3

In the following figure, you can see the patterns of some Persian letters. First, write down each pattern as a  $1 \times 64$  vector. The vectors are called transposed features. Then suggest an MLP network that can separate these patterns. Consider the white squares as 0 and the colored ones as 1. (Hint: To make the problem simple, you can remove the common features among the vectors (those with similar values).)



## Problem 4

Please refer to the MLP notebook. The attached videos help you through this problem.

## Notes

- Codes should be implemented in .ipynb format (notebooks)
- All Code cells should be executed before turning in the assignment (Make sure your outputs are there before you submit your assignment)
- Please explain the code and the results in the notebook
- We will not answer any further questions as comprehension of the questions is part of your overall score
- Please upload your assignments as a zipped folder with all necessary components