Machine learning course
Assignment 2
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Deadline: 3rd Ordibehesht

1. Use numpy package and do as follows:

a) Write a 1-D array with 12 elements of evenly spaced numbers between 0 and 55.

b) Convert the above 1-D array into a 2-D array with 3 rows

c) Add 15 to all the values of the above array

d) Transpose the above array

e) Calculate the element-wise matrix multiplication of M and the above array
(Try using "*")
M = [[1, 2, 1]]

f) Calculate the summation of M and the array in part d

g) Calculate the matrix product of the array in part d and a matrix filled with ones
(Try using 'numpy.ones()')

h) calculate the summation of M and the array in part d

i) Replace all even values of the array in part d with 0

Expected Outputs:

a) array ([0., 5., 10., 15., 20., 25., 30., 35., 40., 45., 50., 55.])

b) [[0. 5. 10. 15.]
 [20. 25. 30. 35.]
 [40. 45. 50. 55.]]

c) [[15. 20. 25. 30.]
 [35. 40. 45. 50.]
 [55. 60. 65. 70.]]

d) [[15. 35. 55.]
 [20. 40. 60.]
 [25. 45. 65.]
 [30. 50. 70.]]

e) [[15. 70. 55.]
 [20. 80. 60.]
 [25. 90. 65.]
 [30. 100. 70.]]

[[15. 70. 55.]
 [20. 80. 60.]
 [25. 90. 65.]
 [30. 100. 70.]]

f) [[16. 37. 56.]
 [21. 42. 61.]
 [26. 47. 66.]
 [31. 52. 71.]]

g) [[105. 105. 105. 105.]
 [120. 120. 120. 120.]
 [135. 135. 135. 135.]
 [150. 150. 150. 150.]]

h) [[16. 37. 56.]
 [21. 42. 61.]
 [26. 47. 66.]
 [31. 52. 71.]]

i) [[15. 35. 55.]
 [0. 0. 0.]
 [25. 45. 65.]
 [0. 0. 0.]]

2. The following datasets describe the populations of Iran and Turkey from 1960 to 2016, which is expressed as in millions.

years = [1960, 1970, 1980, 1990, 2000, 2010, 2016]
Iran_pop = [21.91, 28.51, 38.67, 56.23, 66.13, 74.57, 80.28]
Turkey_pop = [20,30,40,50,60,70,80]

Plot the databases as a line chart by considering the following factors:

- Mark each point of Iran's population with "+"
- Use a dashed line for Turkey's population
- Add labels to the x- and y-axis
- Add grid lines to the plot
- Write a title for the plot
- Set the ticks on y-axis to ['20M', '30M', '40M', '50M', '60M', '70M', '80M',]
- Place the legends on the best possible location

Expected plot: