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| [Machine Learning]  [2021-1] |  |
| Homework 1 |  |
| [Due Date] 2021.04.02  Student ID :  Name :  Professor : Juntae Kim | logo-placeholder |

1. Write python codes to solve each of the following problem, and attach the result and description. (20 pts)

* 1. Python : Circle and Rectangle Class design (Week02-Quiz4)

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| Code |
|  |
| Result(Captured images) |
|  |
| Description |
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1-2. Numpy : Matrix Dot Product

For , ,

Compute where

Use these functions:

* np.array(), np.arange(),np.dot()
* X.reshape(), X.T

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| Code |
|  |
| Result(Captured images) |
|  |
| Description |
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1-3. Pandas : From Boston Housing Price dataset, compute “DIS” column’s count, mean, std. (Week03-Quiz4)

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| Code |
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| Result(Captured images) |
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| Description |
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1-4. Matplotlib : Plot for with red triangles.

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| Code |
|  |
| Result(Captured images) |
|  |
| Description |
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2. Explain what Supervised Learning, Unsupervised Learning, and Reinforcement Learning are, and describe the differences. (10 pts)

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| Your Answer |
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3. Describe the concept of “overfitting”, and explain how you can prevent overfitting in supervised learning. (20 pts)

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| Your Answer |
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4. Describe the differences between Gradient Descent and Stochastic Gradient Decent in detail and explain pros and cons (you can explain by using examples). (20 pts)

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| Your Answer |
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5. The seeds.csv dataset represents 7 geometric parameters of wheat kernels for 3 different varieties of wheat. Preprocess the dataset properly and output the cost function graph when you perform AdalineGD and AdalineSGD respectively (Specify the hyperparameter – *η, epoch*, etc.). (30 pts)

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| Code |
|  |
| Result(Captured images) |
|  |
| Description |
|  |

**Note**

1. Submit the file to e-class as pdf

2. Specify your pdf file name as “hw1\_<StudentID>\_<Name>.pdf”

Ex) hw1\_2000123456\_홍길동.pdf