TRƯỜNG ĐẠI HỌC KINH TẾ QUỐC DÂN

KHOA TOÁN KINH TẾ

Data Structures and Algorithms

Stack

Instructor: **Nguyen Thanh Tuan**

TA: **To Duc Anh**

Date Last Edited: January 6, 2024

Make sure your submission is either in notebook (.ipynb) or LATEXformat. You can install jupyter notebook down to your machine, or Google Colab so you dont have to care about managing virtual environment.

In this homework, you will have a datafile, download it to your local machine, then load it with Jupyter Notebook, or upload it to your Google Drive so that you can use with Google Colab.

Problem 1
Re-implement PCA by using numpy.

Problem 2
Load MNIST dataset (preferably from keras, but you can use sklearn if you want)

```
from keras.datasets import mnist
# or
from sklearn import datasets
data = datasets.load_digits()
```

Visualize the image.

Then use PCA to reduce the dimensity of the data. Then visualize all the data.