

Homework Assignment 1

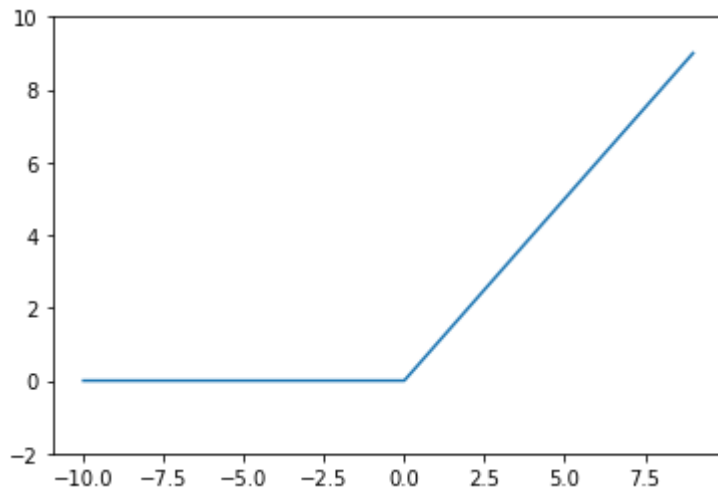
Yuanjian Zhou Jan 18th

Question 1

```
In [2]: import numpy as np
import matplotlib.pyplot as plt
import math
```

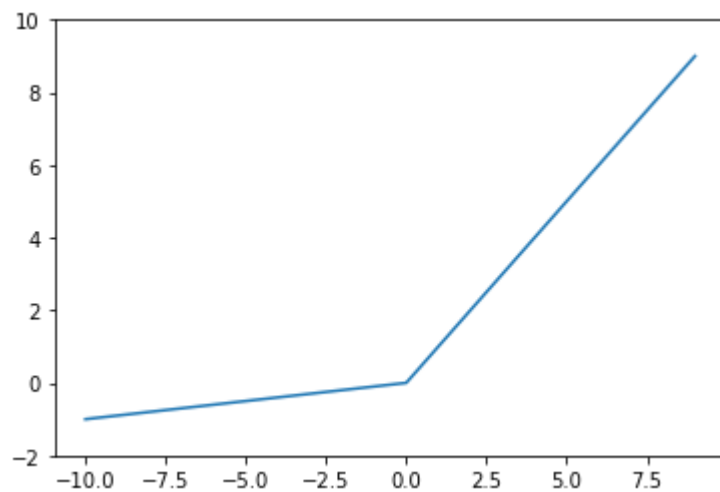
ReLU function:

```
In [10]: ax = plt.subplot(111)
x = np.arange(-10,10)
ReLU = [max(i,0) for i in x]
line = plt.plot(x, ReLU)
plt.ylim(-2, 10)
plt.show()
```



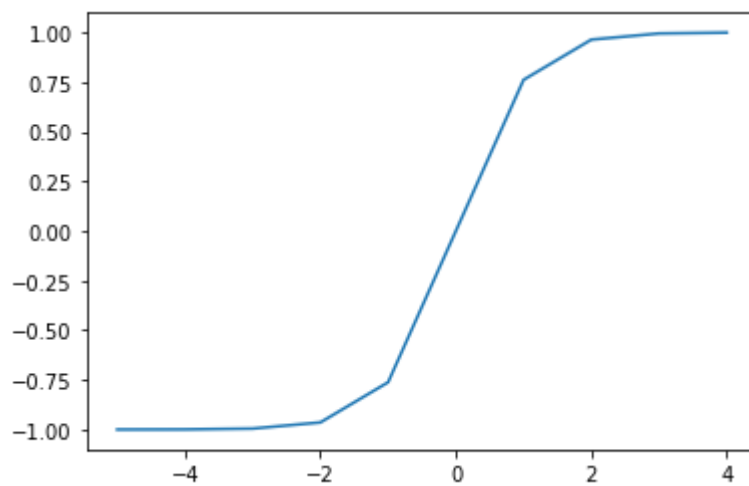
Leaky ReLU function

```
In [8]: ax = plt.subplot(111)
x = np.arange(-10, 10)
leakyReLU = [max(0.1 * i, i) for i in x]
line = plt.plot(x, leakyReLU)
plt.ylim(-2, 10)
plt.show()
```



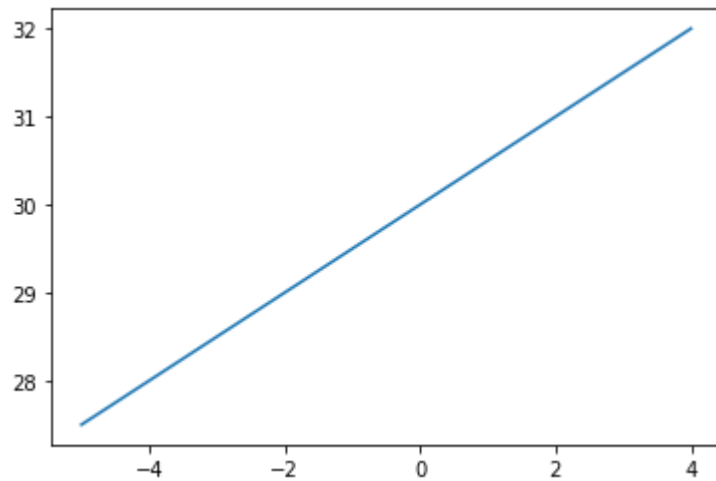
Tanh(x)

```
In [46]: ax = plt.subplot(111)
x = np.arange(-5, 5)
tanh = np.tanh(x)
line = plt.plot(x, tanh)
plt.show()
```



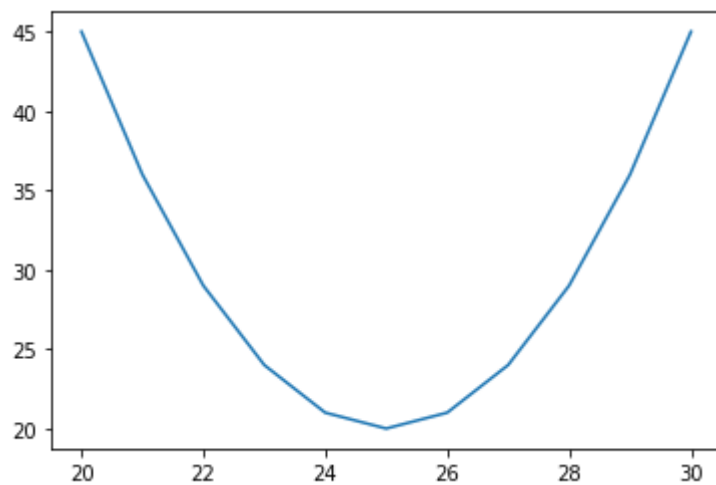
Straight line

```
In [47]: ax = plt.subplot(111)
x = np.arange(-5, 5)
y = 30 + 0.5 * x
line = plt.plot(x, y)
plt.show()
```



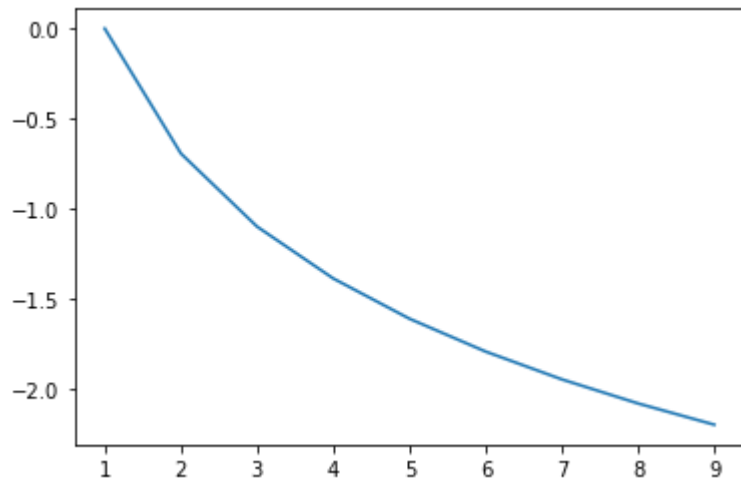
Quadratic function

```
In [26]: ax = plt.subplot(111)
x = np.arange(20, 31)
y = (x - 25) ** 2 + 20
line = plt.plot(x, y)
plt.show()
```

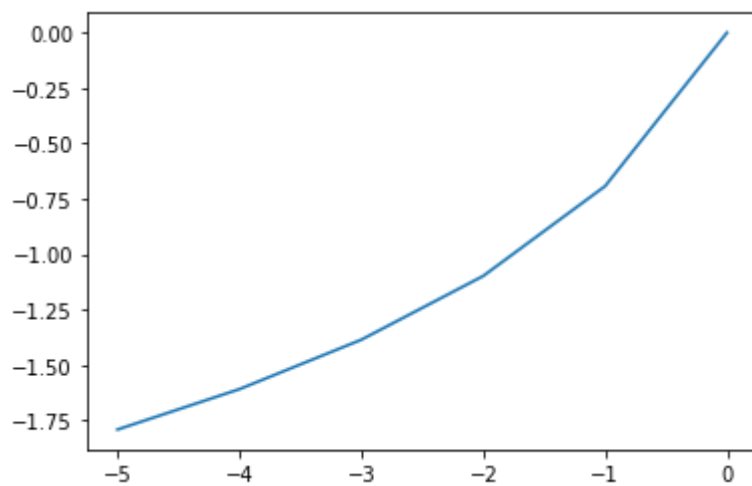


Log function

```
In [37]: ax = plt.subplot(111)
x = np.arange(1, 10)
y = - np.log(x)
line = plt.plot(x, y)
plt.show()
```

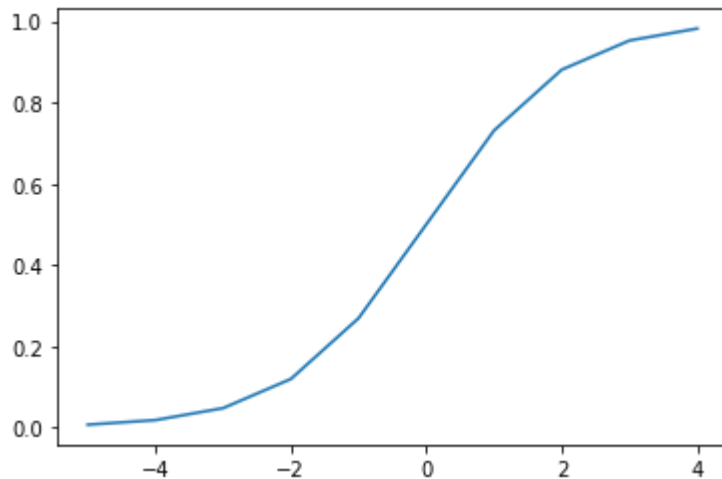


```
In [38]: ax = plt.subplot(111)
x = np.arange(-5, 1)
y = - np.log(1 - x)
line = plt.plot(x, y)
plt.show()
```



Sigmoid Function

```
In [43]: ax = plt.subplot(111)
x = np.arange(-5, 5)
y = 1 / (1 + np.exp(-x))
line = plt.plot(x, y)
plt.show()
```



Question 2

choose **b**

Question 3

- Task: The task will be to judge whether an individual will pay his loan in time. To complete this task, I will use a logistic regression algorithm. My inputs will be a list of features of a large number of lenders, such as their incomes, their housing conditions, their work. My outputs will be a number between 0 and 1. Using some methods that I have not learned to decide the threshold, I will denote individuals with a output over this threshold as having a output 1, similarly individuals with a output below this threshold will be labeled 0. Usually 1 means the indivudal will not pay his loans in time.
- Data preparation: If I am working on this task for a bank, surely they will provide me with historical data of loans records. These records will include whther this individual paid his loan in time and some features of him. This will be a very good dataset, and we can trust in the truth of labels for all samples. After collecting this dataset, I will divide it into 3 parts, 60% for training data, 20% for validation data and 20% for testing data, and the separation will be based on some randomized method.