

Lab Numpy

Q1.

1. Randomly generate a 2*2 matrix and return the minimum value of x along the second axis.
2. Randomly generate a 2*5 matrix and calculate the difference between the maximum and the minimum of x along the second axis.
3. Randomly generate a 2*3 matrix and get the values and indices of the elements that are bigger than 2 in x.

Q2.

1. Randomly generate a vector and draw corresponding histogram
2. Randomly generate two vectors and draw scatter plot

Q3. Predict the output of the following code:

```
x = [1,2]
y = [[4, 1], [2, 2]]
print(np.dot(x, y))
print(np.dot(y, x))
print(np.inner(x, y))
print(np.inner(y, x))
```

And type it in Python to see if they match your prediction

Q4. Curve fitting for a sin function. First of all, randomly generate a dataset following sin function (you can refer to the code below for the generation of such a simulated dataset. You can change the parameter values in this data generation process).

```
x_data = np.linspace(-5, 5, num=50)
y_data = 2.9 * np.sin(1.5 * x_data) + np.random.normal(size=50)
```

plot this dataset using scatter plot. Then use curve_fit function in numpy to fit a sin function specified below:

$$y = a \cdot \sin(b \cdot x).$$

Here a and b are the two parameter we want to estimate using curve_fit.