# CS 5710 –Machine Learning
# Programming Assignment-3

**GITHUB LINK: https://github.com/vijender6/vijender**

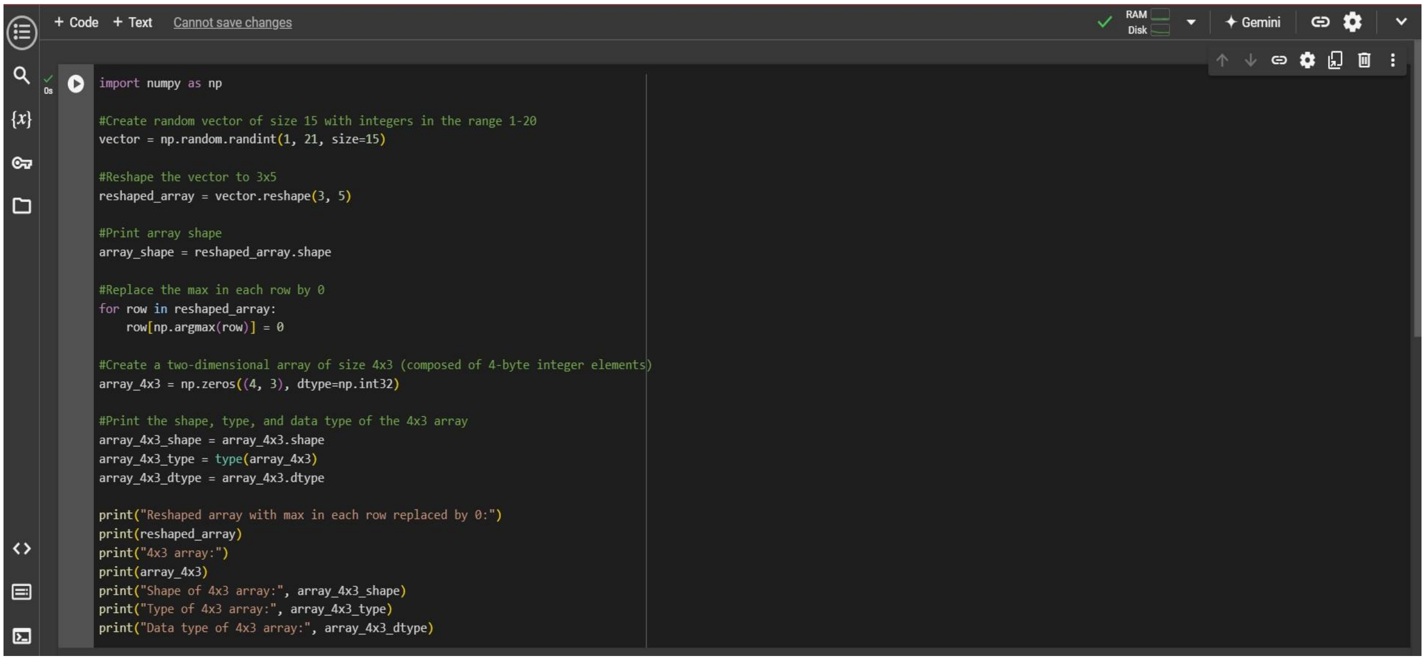
**RECORDING VIDEO LINK: https://drive.google.com/file/d/1tbkWAF3TCJC7tKidJeF6a5Zh9GFFAcVA/view?usp=drive_link**

**NAME: VIJENDER REDDY KOOTURU**
**700765220**

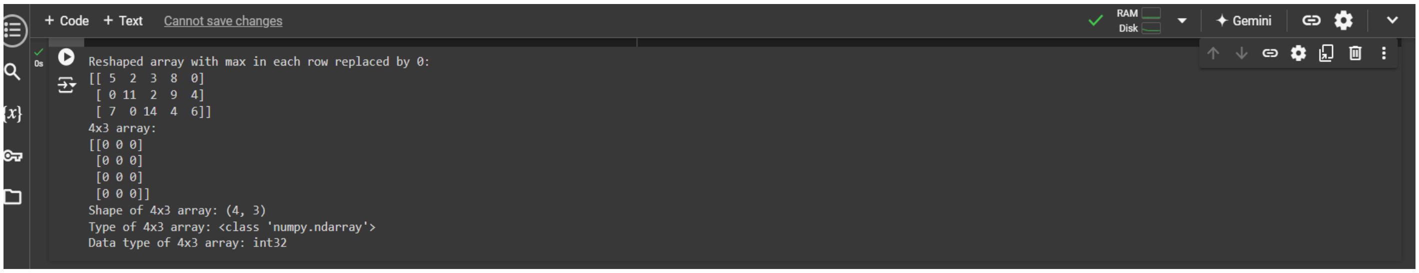
a) Using NumPy create random vector of size 15 having only Integers in the range 1-20.

1. Reshape the array to 3 by 5
2. Print array shape.
3. Replace the max in each row by 0

Create a 2-dimensional array of size 4 x 3 (composed of 4-byte integer elements), also print the shape, type and data type of the array.

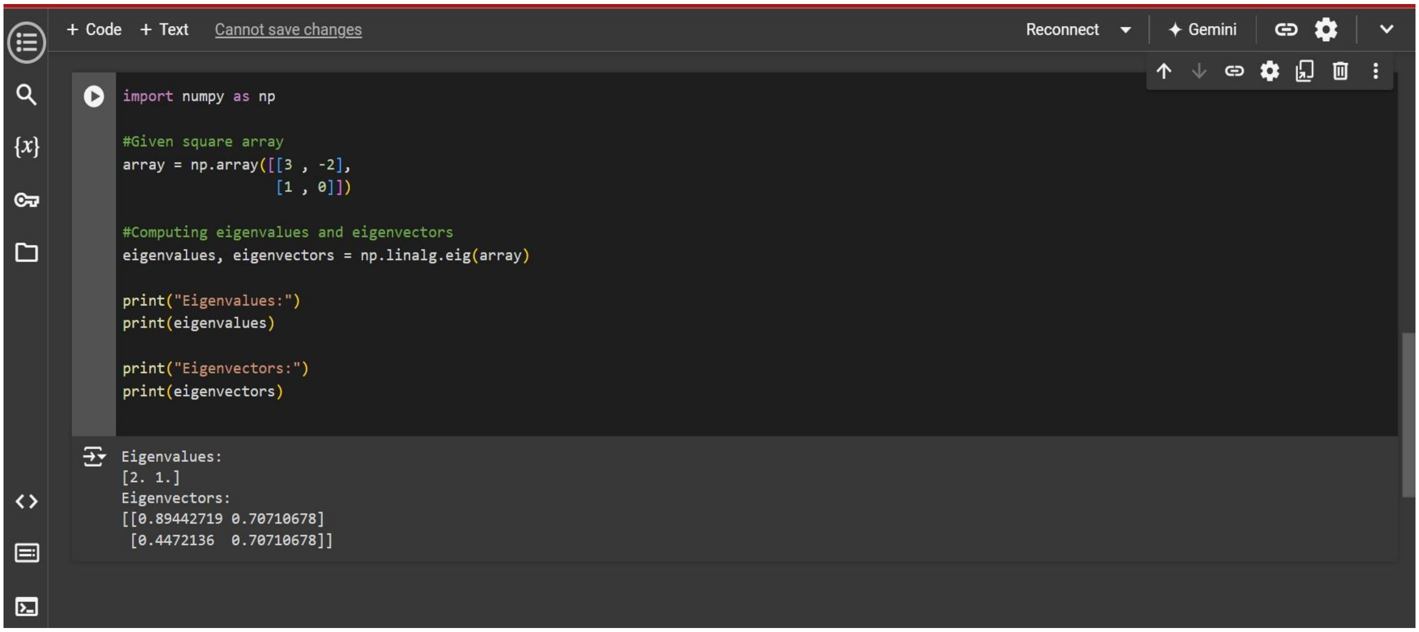


```
import numpy as np

#Create random vector of size 15 with integers in the range 1-20
vector = np.random.randint(1, 21, size=15)

#Reshape the vector to 3x5
reshaped_array = vector.reshape(3, 5)

#Print array shape
array_shape = reshaped_array.shape

#Replace the max in each row by 0
for row in reshaped_array:
    row[np.argmax(row)] = 0

#Create a two-dimensional array of size 4x3 (composed of 4-byte integer elements)
array_4x3 = np.zeros((4, 3), dtype=np.int32)

#Print the shape, type, and data type of the 4x3 array
array_4x3_shape = array_4x3.shape
array_4x3_type = type(array_4x3)
array_4x3_dtype = array_4x3.dtype

print("Reshaped array with max in each row replaced by 0:")
print(reshaped_array)
print("4x3 array:")
print(array_4x3)
print("Shape of 4x3 array:", array_4x3_shape)
print("Type of 4x3 array:", array_4x3_type)
print("Data type of 4x3 array:", array_4x3_dtype)
```



```
Reshaped array with max in each row replaced by 0:
[[ 5  2  3  8  0]
 [ 0 11  2  9  4]
 [ 7  0 14  4  6]]
4x3 array:
[[0 0 0]
 [0 0 0]
 [0 0 0]
 [0 0 0]]
Shape of 4x3 array: (4, 3)
Type of 4x3 array: <class 'numpy.ndarray'>
Data type of 4x3 array: int32
```

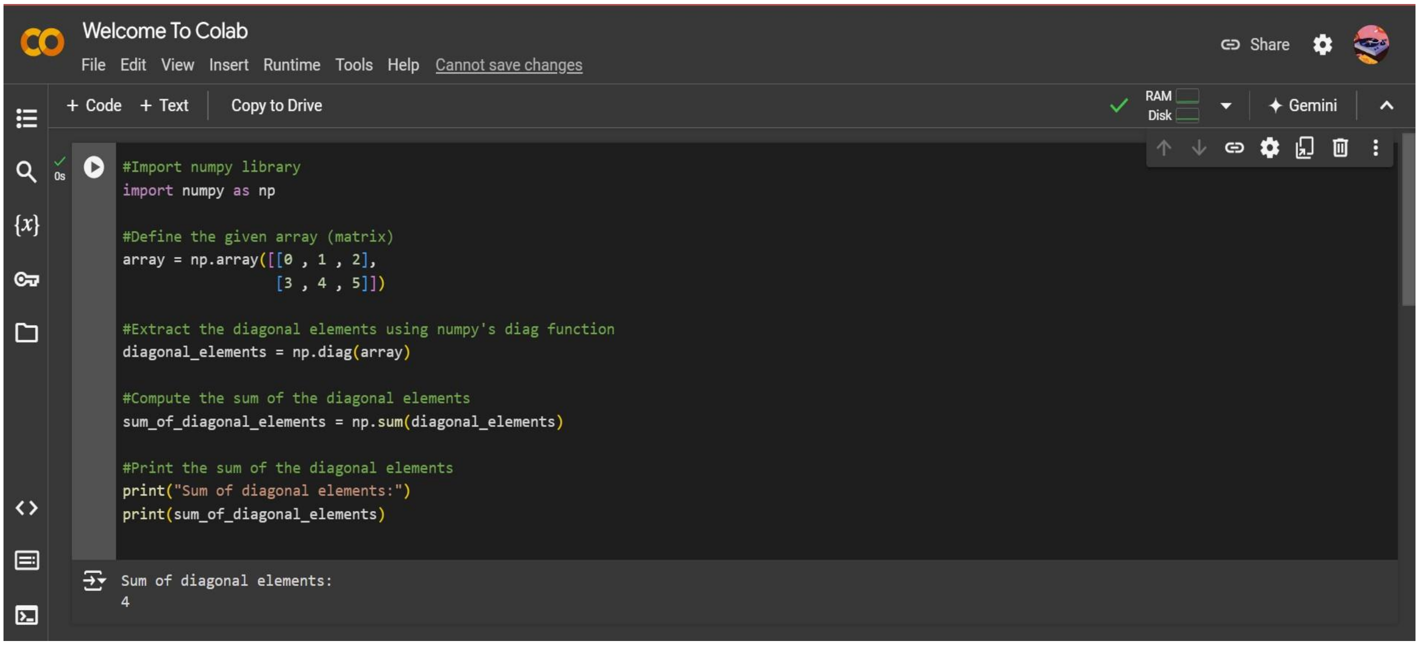
b. Write a program to compute the eigenvalues and right eigenvectors of a given square array given below:



```python
import numpy as np

#Given square array
array = np.array([[3 , -2],
                  [1 , 0]])

#Computing eigenvalues and eigenvectors
eigenvalues, eigenvectors = np.linalg.eig(array)

print("Eigenvalues:")
print(eigenvalues)

print("Eigenvectors:")
print(eigenvectors)
```

```
Eigenvalues:
[2. 1.]
Eigenvectors:
[[0.89442719 0.70710678]
 [0.4472136  0.70710678]]
```

c. Compute the sum of the diagonal element of a given array.

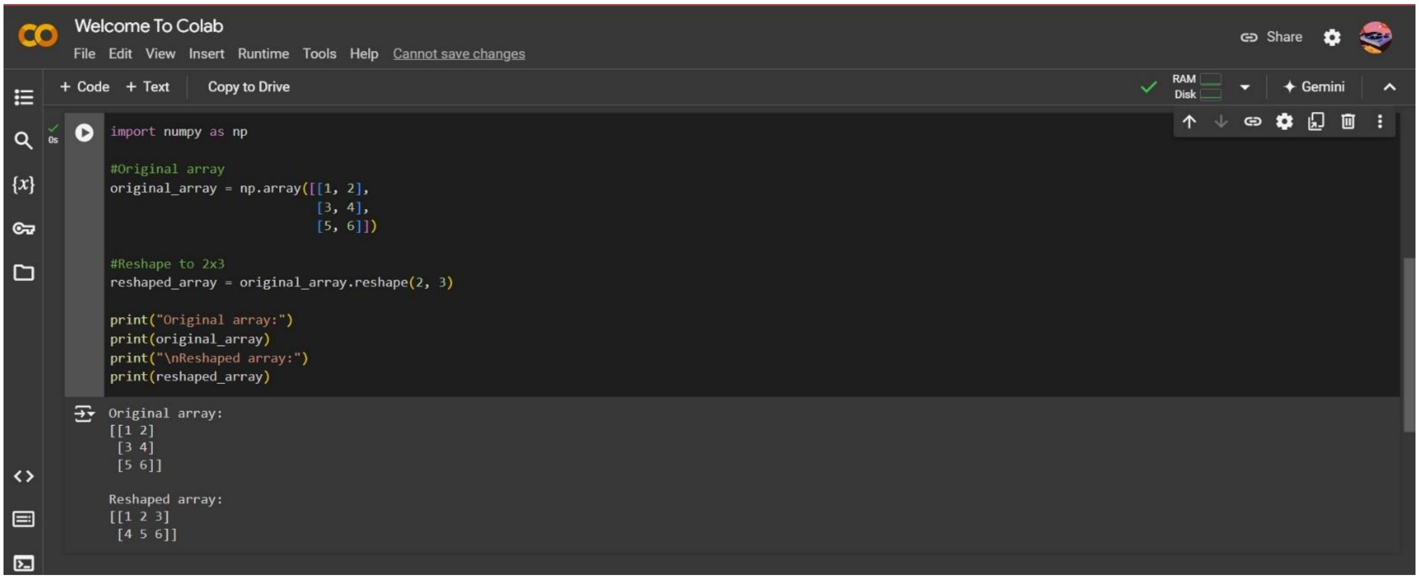


```python
#Import numpy library
import numpy as np

#Define the given array (matrix)
array = np.array([[0 , 1 , 2],
                  [3 , 4 , 5]])

#Extract the diagonal elements using numpy's diag function
diagonal_elements = np.diag(array)

#Compute the sum of the diagonal elements
sum_of_diagonal_elements = np.sum(diagonal_elements)

#Print the sum of the diagonal elements
print("Sum of diagonal elements:")
print(sum_of_diagonal_elements)
```

```
Sum of diagonal elements:
4
```

d. Write a NumPy program to create a new shape to an array without changing its data.

Reshape 3x2. Reshape 2x3:



```python
import numpy as np

#Original array
original_array = np.array([[1, 2],
                           [3, 4],
                           [5, 6]])

#Reshape to 2x3
reshaped_array = original_array.reshape(2, 3)

print("Original array:")
print(original_array)
print("\nReshaped array:")
print(reshaped_array)
```

```
Original array:
[[1 2]
 [3 4]
 [5 6]]

Reshaped array:
[[1 2 3]
 [4 5 6]]
```