In [ ]:
```python
# MALLIGESH M - 212223230119
```

In [1]:
```python
#Write a NumPy program to create a vector with values from 0 to 20 and change th
import numpy as np
x = np.arange(21)
print("Original vector:")
print(x)
print("After changing the sign of the numbers in the range from 9 to 15:")
x[(x >= 9) & (x <= 15)] *= -1
print(x)
```

```
Original vector:
[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20]
After changing the sign of the numbers in the range from 9 to 15:
[  0   1   2   3   4   5   6   7   8  -9 -10 -11 -12 -13 -14 -15  16  17
  18  19  20]
```

In [2]:
```python
#Write a NumPy program to create a 10x10 matrix, in which the elements on the bo
import numpy as np
x = np.ones((10, 10))
x[1:-1, 1:-1] = 0
print(x)
```

```
[[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]]
```

In [3]:
```python
#Write a NumPy program to create an array of 10 zeros,10 ones, 10 fives.
import numpy as np
array=np.zeros(10)
print("An array of 10 zeros:")
print(array)
array=np.ones(10)
print("An array of 10 ones:")
print(array)
array=np.ones(10)*5
print("An array of 10 fives:")
print(array)
```

```
An array of 10 zeros:
[0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
An array of 10 ones:
[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
An array of 10 fives:
[5. 5. 5. 5. 5. 5. 5. 5. 5. 5.]
```

In [4]:
```python
#Write a NumPy program to add a vector to each row of a given matrix.
import numpy as np
m = np.array([[1,2,3], [4,5,6], [7,8,9], [10, 11, 12]])
v = np.array([1, 1, 0])
print("Original vector:")
print(v)
```

```python
print("Original matrix:")
print(m)
result = np.empty_like(m)
for i in range(4):
    result[i, :] = m[i, :] + v
print("\nAfter adding the vector v to each row of the matrix m:")
print(result)
```

```
Original vector:
[1 1 0]
Original matrix:
[[ 1  2  3]
 [ 4  5  6]
 [ 7  8  9]
 [10 11 12]]

After adding the vector v to each row of the matrix m:
[[ 2  3  3]
 [ 5  6  6]
 [ 8  9  9]
 [11 12 12]]
```

In [5]:
```python
#Write a NumPy program to compute sum of all elements, sum of each column and su
import numpy as np
x = np.array([[0,1],[2,3]])
print("Original array:")
print(x)
print("Sum of all elements:")
print(np.sum(x))
print("Sum of each column:")
print(np.sum(x, axis=0))
print("Sum of each row:")
print(np.sum(x, axis=1))
```

```
Original array:
[[0 1]
 [2 3]]
Sum of all elements:
6
Sum of each column:
[2 4]
Sum of each row:
[1 5]
```

In [7]:
```python
#Write a NumPy program to extract all numbers from a given array which are less
#Note- Print the array greater than 5
#Print the array less than 6
import numpy as np
nums = np.array([[5.54, 3.38, 7.99], [3.54, 4.38, 6.99], [1.54, 2.39, 9.29]])
print("Original array:")
print(nums)
n = 5
print("\nElements of the said array greater than",n)
print(nums[nums > n])
n = 6
print("\nElements of the said array less than",n)
print(nums[nums < n])
```

```
Original array:
[[5.54 3.38 7.99]
 [3.54 4.38 6.99]
 [1.54 2.39 9.29]]

Elements of the said array greater than 5
[5.54 7.99 6.99 9.29]

Elements of the said array less than 6
[5.54 3.38 3.54 4.38 1.54 2.39]
```

In [8]:
```python
#Write a NumPy program to create a vector with values ranging from 15 to 55 and

import numpy as np
v = np.arange(15,55)
print("Original vector:")
print(v)
print("All values except the first and last of the said vector:")
print(v[1:-1])
```

```
Original vector:
[15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54]
All values except the first and last of the said vector:
[16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
 40 41 42 43 44 45 46 47 48 49 50 51 52 53]
```

In [9]:
```python
# Write a NumPy program to insert a new axis within a 2-D array.2-D array of sha
import numpy as np
x = np.zeros((3, 4))
y = np.expand_dims(x, axis=1).shape
print(y)
z = np.expand_dims(x, axis=2).shape
print(z)
a = np.expand_dims(x, axis=0).shape
print(a)
```

```
(3, 1, 4)
(3, 4, 1)
(1, 3, 4)
```

In [10]:
```python
#Write a NumPy program  to sum of all the multiples of 3 or 5 below 100
import numpy as np
x = np.arange(1, 100)
# find  multiple of 3 or 5
n= x[(x % 3 == 0) | (x % 5 == 0)]
print(n[:100])
# print sum the numbers
print(n.sum())
```

```
[ 3  5  6  9 10 12 15 18 20 21 24 25 27 30 33 35 36 39 40 42 45 48 50 51
 54 55 57 60 63 65 66 69 70 72 75 78 80 81 84 85 87 90 93 95 96 99]
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```

In [ ]: