Task 12

Exercise 1: Multiplication

Create two arrays with different shapes (e.g., `(3,)` and `(3, 3)`) and perform element-wise multiplication using numpy broadcasting.

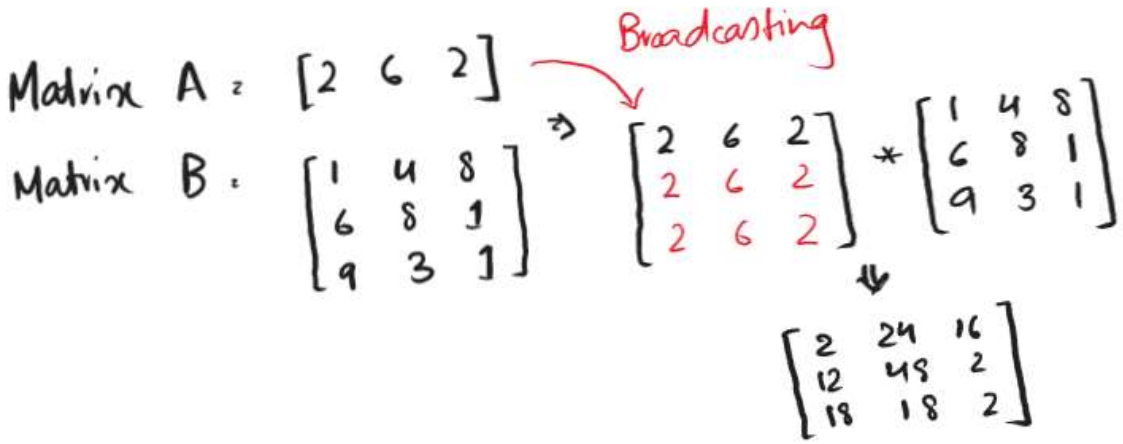
In [ ]:
```
import numpy as np

a=np.random.randint(1,10,(3,))
b=np.random.randint(1,10,(3,3))
print("Matrix A is: \n", a, "\n")
print("Matrix B is: \n", b, "\n")
print("Matrix A*B is: \n", a*b, "\n")
```

```
Matrix A is:
 [2 6 2]

Matrix B is:
 [[1 4 8]
 [6 8 1]
 [9 3 1]]

Matrix A*B is:
 [[ 2 24 16]
 [12 48  2]
 [18 18  2]]
```



Exercise 2: Addition

Create an array with shape `(2, 3, 4)` and another array with shape `(3, 4)` and perform element-wise addition using numpy broadcasting.

In [ ]:
```
a=np.random.randint(1,10,(2,3,4))
b=np.random.randint(1,10,(3,4))
print("Matrix A is: \n", a, "\n")
print("Matrix B is: \n", b, "\n")
print("Matrix A+B is: \n", a+b, "\n")
```

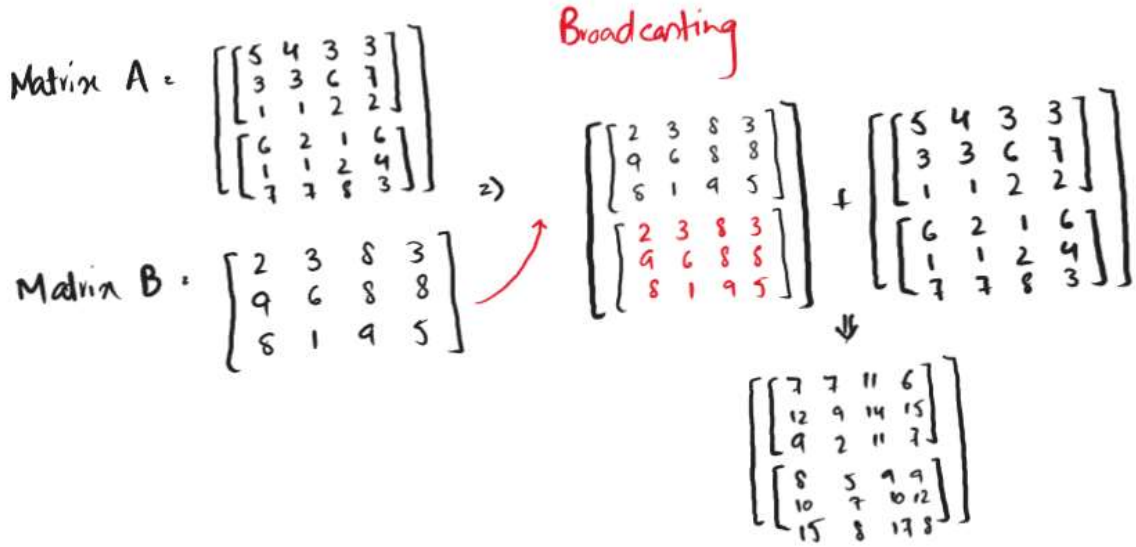
```
Matrix A is:
 [[[5 4 3 3]
  [3 3 6 7]
  [1 1 2 2]]

 [[6 2 1 6]
  [1 1 2 4]
  [7 7 8 3]]]

Matrix B is:
 [[2 3 8 3]
 [9 6 8 8]
 [8 1 9 5]]

Matrix A+B is:
 [[[ 7  7 11  6]
  [12  9 14 15]
  [ 9  2 11  7]]

 [[ 8  5  9  9]
  [10  7 10 12]
  [15  8 17  8]]]
```



Exercise 3: Division

Create an array with shape `(2, 3)` and another array with shape `(1, 3)` and perform element-wise division using numpy broadcasting.

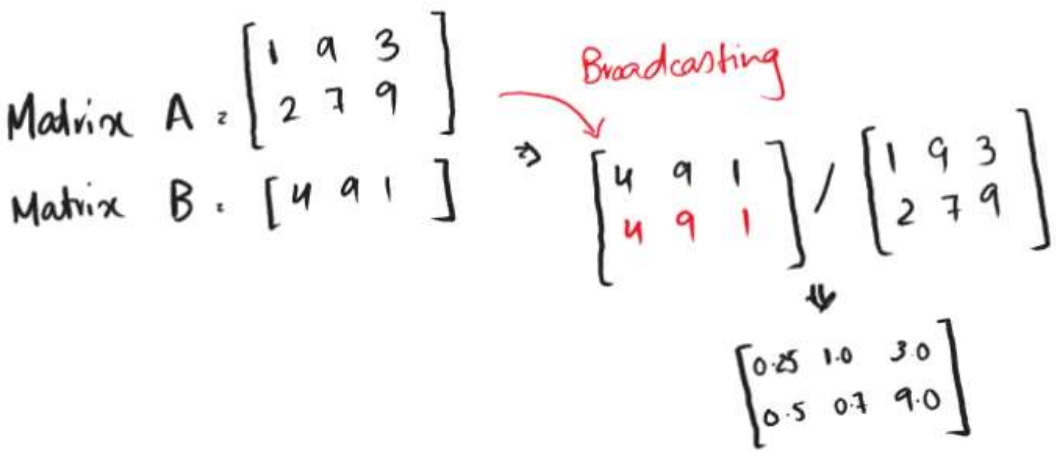
In [ ]:
```
a=np.random.randint(1,10,(2,3))
b=np.random.randint(1,10,(1,3))
```

```
print("Matrix A is: \n", a, "\n")
print("Matrix B is: \n", b, "\n")
print("Matrix A/B is: \n", a/b, "\n")
```

```
Matrix A is:
 [[1 9 3]
 [2 7 9]]

Matrix B is:
 [[4 9 1]]

Matrix A/B is:
 [[0.25       1.         3.        ]
 [0.5        0.77777778 9.        ]]
```



Exercise 4: Subtraction

Create an array with shape `(3, 1)` and another array with shape `(3,)` and perform element-wise subtraction using numpy broadcasting.

In [ ]:
```
a=np.random.randint(1,10,(3,1))
b=np.random.randint(1,10,(3,))
print("Matrix A is: \n", a, "\n")
print("Matrix B is: \n", b, "\n")
print("Matrix A-B is: \n", a-b, "\n")
```

```
Matrix A is:
 [[2]
 [7]
 [5]]

Matrix B is:
 [7 4 9]

Matrix A-B is:
 [[-5 -2 -7]
 [ 0  3 -2]
 [-2  1 -4]]
```

Matrix A = $\begin{bmatrix} 2 \\ 1 \\ 5 \end{bmatrix}$

Matrix B = $\begin{bmatrix} 1 & 4 & 9 \end{bmatrix}$

Broadcasting

$\Rightarrow \begin{bmatrix} 2 & 2 & 2 \\ 1 & 1 & 1 \\ 5 & 5 & 5 \end{bmatrix} - \begin{bmatrix} 1 & 4 & 9 \\ 1 & 4 & 9 \\ 1 & 4 & 9 \end{bmatrix}$

$\Downarrow$

$\begin{bmatrix} -5 & -2 & -7 \\ 0 & 3 & -2 \\ -2 & 1 & -4 \end{bmatrix}$