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4. Create/Define single dimension / multidimensional arrays, and arrays with specific values like array of all ones, all zeros, array with random values within a range, or a diagonal matrix.

```python
import numpy as np
```

```python
# Creating single-dimension arrays
x = np.array([1, 2, 3, 4, 5])
print('x = ', x)

y = np.array([[1], [2], [3]])
print('y = \n', y)
```

```
x =  [1 2 3 4 5]
y =
 [[1]
 [2]
 [3]]
```

```python
# Creating multi-dimension arrays
z = np.array([[1, 2, 3], [6, 7, 8]])
print('z = \n', z)

z1 = np.matrix('1 2 3; 6 7 8')
print('z1 = \n', z1)
```

```
z =
 [[1 2 3]
 [6 7 8]]
z1 =
 [[1 2 3]
 [6 7 8]]
```

```python
# Matrix with all ones
A = np.ones((4, 4))
A
```

```python
# Matrix with all ones
A = np.ones((4, 4))
A
```

```
[16]
```

```
array([[1., 1., 1., 1.],
       [1., 1., 1., 1.],
       [1., 1., 1., 1.],
       [1., 1., 1., 1.]])
```

```python
# Matrix with all zeros
B = np.zeros((4, 4))
B
```

```
[17]
```

```
array([[0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.]])
```

```python
# Matrix with random values within a range
C = np.random.randint(20, 50, (4,5))
print("C = \n", C)

# Matrix with range
C1 = np.arange(12).reshape((3, 4))
print("C1 = \n", C1)
```

```
[18]
```

```
C =
 [[30 39 40 29 32]
 [23 47 36 32 22]
 [41 27 26 20 49]
 [35 39 46 30 44]]
C1 =
 [[ 0  1  2  3]
 [ 4  5  6  7]
```

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```
[17]
...    array([[0., 0., 0., 0.],
              [0., 0., 0., 0.],
              [0., 0., 0., 0.],
              [0., 0., 0., 0.]])
```

```
        # Matrix with random values within a range
        C = np.random.randint(20, 50, (4,5))
        print("C = \n", C)

        # Matrix with range
        C1 = np.arange(12).reshape((3, 4))
        print("C1 = \n", C1)
[18]
```

```
...    C =
       [[30 39 40 29 32]
        [23 47 36 32 22]
        [41 27 26 20 49]
        [35 39 46 30 44]]
       C1 =
       [[ 0  1  2  3]
        [ 4  5  6  7]
        [ 8  9 10 11]]
```

```
        # Diagonal matrix
        D = np.diag([1, 2, 3, 4, 5])
        print('D = \n', D)
[19]
```

```
...    D =
       [[1 0 0 0 0]
        [0 2 0 0 0]
        [0 0 3 0 0]
        [0 0 0 4 0]
        [0 0 0 0 5]]
```