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import numpy as np
import string

# 1) Create the same NumPy array using a Python range and a list
x1 = np.array(list(range(5)))
x2 = np.array([i for i in range(5)])
print(x1)
print(x2)
# OUTPUT :-
# [0 1 2 3 4]
# [0 1 2 3 4]

# 2) Create a 1D NumPy array from 10 to 100 counting by 10
x3 = np.arange(10, 110, 10)
print(x3)
# OUTPUT :-
# [ 10  20  30  40  50  60  70  80  90 100]

# 3) Create a NumPy array of capital letters A-Z
x4 = np.array([c for c in string.ascii_uppercase])
print(x4)
# OUTPUT :-
# ['A' 'B' 'C' 'D' 'E' 'F' 'G' 'H' 'I' 'J' 'K' 'L' 'M'
#  'N' 'O' 'P' 'Q' 'R' 'S' 'T' 'U' 'V' 'W' 'X' 'Y' 'Z']

# 4) Create a 10-element NumPy array of all zeros
x5 = np.zeros((1, 10))[0]
print(x5)
# OUTPUT :-
# [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]

# 5) Create a 10-element NumPy array of all ones
x6 = np.ones(10)
print(x6)
# OUTPUT :-
# [1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]

# 6) Find the data type of array created in Question 3
print(x4.dtype)
# OUTPUT :-
# <U1

# 7) Create a 10-element array of random integers between 1 and 5 (inclusive)
x7 = np.random.randint(1, 6, size=10)
print(x7)
# OUTPUT :-
# Example: [3 1 5 2 4 1 2 5 3 4]

# 8) Create a 1D array of numbers from 0 to 9
x8 = np.arange(0, 10)
print(x8)
# OUTPUT :-
# [0 1 2 3 4 5 6 7 8 9]

# 9) Extract all odd numbers from the array
x9 = x8[x8 % 2 == 1]
print(x9)
# OUTPUT :-
# [1 3 5 7 9]

# 10) Replace all odd numbers in the array with -1
x10 = x8.copy()
x10[x10 % 2 == 1] = -1
print(x10)

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# OUTPUT :-
# [ 0 -1  2 -1  4 -1  6 -1  8 -1 ]

# 11) Create a NumPy array of even numbers from 2 to 20
x11 = np.arange(2, 22, 2)
print(x11)
# OUTPUT :-
# [ 2  4  6  8 10 12 14 16 18 20 ]

# 12) Create a NumPy array of 5 equally spaced numbers between 0 and 1
x12 = np.linspace(0, 1, num=5)
print(x12)
# OUTPUT :-
# [0.    0.25 0.5   0.75 1.   ]

# 13) Create a 3x3 NumPy array filled with value 7
x13 = np.ones((3, 3), dtype=int) * 7
print(x13)
# OUTPUT :-
# [[7 7 7]
#  [7 7 7]
#  [7 7 7]]

# 14) Create a 4x4 identity matrix
x14 = np.identity(4)
print(x14)
# OUTPUT :-
# [[1. 0. 0. 0.]
#  [0. 1. 0. 0.]
#  [0. 0. 1. 0.]
#  [0. 0. 0. 1.]]

# 15) Create an array of 10 random floating-point numbers between 0 and 1
x15 = np.random.random(10)
print(x15)
# OUTPUT :-
# Example: [0.45 0.12 0.78 0.33 0.91 0.66 0.28 0.54 0.07 0.88]

# 16) Reshape a 1D array from 1 to 12 into a 3x4 matrix
x16 = np.arange(1, 13).reshape(3, 4)
print(x16)
# OUTPUT :-
# [[ 1  2  3  4]
#  [ 5  6  7  8]
#  [ 9 10 11 12]]

# 17) Find the shape and dimension of the above array
print(x16.shape)
print(x16.ndim)
# OUTPUT :-
# (3, 4)
# 2

# 18) Create a NumPy array from 1 to 25 and reshape into 5x5
x17 = np.arange(1, 26).reshape(5, 5)
print(x17)
# OUTPUT :-
# [[ 1  2  3  4  5]
#  [ 6  7  8  9 10]
#  [11 12 13 14 15]
#  [16 17 18 19 20]
#  [21 22 23 24 25]]

# 19) Extract the first row

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print(x17[0])
# OUTPUT :-
# [1 2 3 4 5]

# 20) Extract the last column
print(x17[:, -1])
# OUTPUT :-
# [ 5 10 15 20 25]

# 21) Replace all values greater than 15 with 0
x17[x17 > 15] = 0
print(x17)
# OUTPUT :-
# [[ 1  2  3  4  5]
#   [ 6  7  8  9 10]
#   [11 12 13 14 15]
#   [ 0  0  0  0  0]
#   [ 0  0  0  0  0]]
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