

Arrays and Loops

Problem 1

Import Numpy

- Create an array of 50 ones called x .
- Create an array from 1-20 with 50 equally-spaced elements two different ways (using a loop and a single command). Call the two arrays y and z .
- Subtract y from z and report the sum of the absolute difference of each element to show that they are the same.

Problem 2

import the python package "random"

- Create a matrix, M , as a 1x1 numpy array of value 1
- Using a while loop, append a random integer between 1 and 10 to the end of matrix M until the last element is a 7.
- Report the number of elements in M and the mean value of the elements after the loop.
- Also, because a while loop is easily susceptible to infinite loops, create a variable i to keep track of how many times you have gone through the while loop. If i exceeds 30, immediately exit the while loop. Don't report the matrix size using i .

You may need to search online (e.g. Google) how to create a random integer using the random package and how to append elements to a numpy array.

Problem 3

Using the following array, a :

Reshape the array to a 5x5 matrix (using a numpy command)

Loop through each element of the array. If the element value is 5 or 8, print the element index. Also, keep track of how many 5s and 8s there are with variable k . Print k . If the element value is a 1, print "You win!"

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In [2]: a = np.array([ 8., 3., 10., 8., 2., 2., 10., 10., 5., 10., 2., 10., 9., 10., 9., 4., 2., 8., 7., 4., 1., 4., 5., 6., 6.])
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Problem 4

For the following arrays (matrices and vectors):

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$x = \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix}$$

$$B = \begin{bmatrix} -0.1 & -0.2 & -0.3 \\ 3 & 10 & 2 \\ 4 & 2 & 0.5 \end{bmatrix}$$

Perform the following operations:

- $A \circ B$ (element-wise multiplication)
- $A \bullet B$ (dot product multiplication)
- $A \times B$ (cross product multiplication)
- $A \bullet x$
- $A^{-1} \bullet B$

In []: