

# Assignment Numpy

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Write a function so that the columns of the output matrix are powers of the input vector.

The order of the powers is determined by the increasing boolean argument. Specifically, when increasing is False, the i-th output column is the input vector raised element-wise to the power of  $N - i - 1$ .

HINT: Such a matrix with a geometric progression in each row is named for Alexandre-Theophile Vandermonde.

```
[1] import numpy as np
```

```
▶ x = np.array([1, 2, 3, 4, 5])  
  N = 4  
  np.vander(x, N)
```

```
↳ array([[ 1,  1,  1,  1],  
         [ 8,  4,  2,  1],  
         [27,  9,  3,  1],  
         [64, 16,  4,  1],  
         [125, 25,  5,  1]])
```

## Problem Statement

Given a sequence of  $n$  values  $x_1, x_2, \dots, x_n$  and a window size  $k > 0$ , the  $k$ -th moving average of the given sequence is defined as follows:

```
data = [3,5,7,2,8,10,11,65,72,81,99,100,150]

def mov_avg(val, window):
    weights = np.repeat(1.0, window)/window
    d = np.convolve(val,weights,'valid')
    return d
print(mov_avg(data,3))
```

```
[ 5.          4.66666667  5.66666667  6.66666667  9.66666667
 28.66666667 49.33333333 72.66666667 84.          93.33333333
116.33333333]
```