1)

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

In [28]:
```
def alexTheoVander(iVector, n, increasing = True):
    if increasing:
        oMatrix = np.matrix([x**i for x in iVector for i in range(n)]).reshape(iVector.size,n)
    else:
        oMatrix = np.matrix([x**(n-i-1) for x in iVector for i in range(n)]).reshape(iVector.size, n)
    return oMatrix
```

In [29]:
```
iVector=np.array([1,2,3,4,5])
n=5
```

In [30]:
```
oMatrix=alexTheoVander(iVector, n, increasing = True)
oMatrix
```

Out[30]:
```
matrix([[  1,   1,   1,   1,   1],
        [  1,   2,   4,   8,  16],
        [  1,   3,   9,  27,  81],
        [  1,   4,  16,  64, 256],
        [  1,   5,  25, 125, 625]])
```

In [31]:
```
oMatrix=alexTheoVander(iVector, n, increasing = False)
oMatrix
```

Out[31]:
```
matrix([[  1,   1,   1,   1,   1],
        [ 16,   8,   4,   2,   1],
        [ 81,  27,   9,   3,   1],
        [256,  64,  16,   4,   1],
        [625, 125,  25,   5,   1]])
```

2)

In [38]:
```
def moving_average(x, w):
    return np.convolve(x, np.ones(w), 'valid') / w
```

In [39]:
```
x=np.array([3, 5, 7, 2, 8, 10, 11, 65, 72, 81, 99, 100, 150])
x
```

Out[39]:
```
array([  3,   5,   7,   2,   8,  10,  11,  65,  72,  81,  99, 100, 150])
```

In [40]:
```
moving_average(x,3)
```

Out[40]:
```
array([  5.        ,   4.66666667,   5.66666667,   6.66666667,
         9.66666667,  28.66666667,  49.33333333,  72.66666667,
        84.        ,  93.33333333, 116.33333333])
```

In [ ]:
```

```