Name : Mayur Girase
Roll No : 514
Div : E1

```
# Load the datasets into arrays
data1 = np.genfromtxt('testmarks1.csv', delimiter='\t', skip_header=1)
data2 = np.genfromtxt('testmarks2.csv', delimiter='\t', skip_header=1)


# Matrix Operations
# Addition
matrix_sum = data1 + data2


# Subtraction
matrix_diff = data1 - data2


# Multiplication
matrix_product = np.matmul(data1[:, 1:], data2[:, 1:].T)


# Transpose
matrix_transpose = data1.T


# Horizontal and Vertical Stacking
horizontal_stack = np.hstack((data1, data2))
vertical_stack = np.vstack((data1, data2))


# Custom Sequence Generation
custom_sequence = np.arange(10, 51, 10)


# Arithmetic and Statistical Operations
# Mean
mean = np.mean(data1)
```

```
# Standard Deviation
std_dev = np.std(data1)

# Minimum
minimum = np.min(data1)

# Maximum
maximum = np.max(data1)

# Mathematical Operations
# Square Root
sqrt = np.sqrt(data1)

# Exponential
exp = np.exp(data1)

# Bitwise Operators
bitwise_and = np.bitwise_and(data1.astype(int), data2.astype(int))
bitwise_or = np.bitwise_or(data1.astype(int), data2.astype(int))

# Copying and Viewing Arrays
copy_array = data1.copy()
view_array = data1.view()

# Data Stacking
data_stack = np.column_stack((data1, data2))

# Searching
index = np.where(data1 == 40.9)

# Sorting
```

```
sorted_data = np.sort(data1, axis=0)

# Counting
unique_values, counts = np.unique(data1[:, 1], return_counts=True)

# Broadcasting
broadcasted_array = data1 + 10

# Displaying the results
print("Matrix Sum:")
print(matrix_sum)
print("\nMatrix Difference:")
print(matrix_diff)
print("\nMatrix Product:")
print(matrix_product)
print("\nMatrix Transpose:")
print(matrix_transpose)
print("\nHorizontal Stack:")
print(horizontal_stack)
print("\nVertical Stack:")
print(vertical_stack)
print("\nCustom Sequence:")
print(custom_sequence)
print("\nMean:")
print(mean)
print("\nStandard Deviation:")
print(std_dev)
print("\nMinimum:")
print(minimum)
print("\nMaximum:")
print(maximum)
```

```
print("\nSquare Root:")
print(sqrt)
print("\nExponential:")
print(exp)
print("\nBitwise AND:")
print(bitwise_and)
print("\nBitwise OR:")
print(bitwise_or)
print("\nCopied Array:")
print(copy_array)
print("\nView Array:")
print(view_array)
print("\nData Stack:")
print(data_stack)
print("\nIndex of 40.9 in data1:")
print(index)
print("\nSorted Data:")
print(sorted_data)
print("\nUnique Values and Counts:")
print(unique_values, counts)
print("\nBroadcasted Array:")
print(broadcasted_array)
```

Output:

```
Matrix Sum:
[[1602.     71.53   61.97   59.26   50.02]
 [1604.     71.57   62.24   59.66   50.71]
 [1606.     68.4    59.55   56.36   48.16]
 [1608.     65.4    57.55   54.94   47.09]
 [1610.     67.     57.35   55.49   46.47]
 [1612.     64.92   56.85   54.04   46.26]
 [1614.     67.84   57.02   55.8    45.97]
 [1616.     69.63   60.54   56.96   48.29]
 [1618.     73.38   62.7    60.86   50.89]
 [1620.     77.3    65.3    62.68   51.63]]

Matrix Difference:
[[ 0.   14.57 -6.39 -1.86  5.56]
 [ 0.   15.37 -5.2  -1.7   5.07]
 [ 0.   16.08 -3.23 -0.04  3.1 ]
```

```
 [ 0.   13.08 -5.23 -2.62  5.23]
 [ 0.   14.8  -5.29 -0.95  4.83]
 [ 0.   14.02 -4.23 -1.42  4.16]
 [ 0.   15.52 -5.76 -0.22  4.95]
 [ 0.   14.75 -5.32 -0.7   4.13]
 [ 0.   16.12 -6.   -1.2   5.53]
 [ 0.   16.6  -7.54 -0.08  5.43]]

Matrix Product:
[[3670.7699 3661.4676 3433.9648 3406.1468 3382.4896 3325.1596 3372.376
  3537.4409 3707.9462 3861.2343]
 [3718.4627 3708.7576 3478.0157 3450.2001 3426.2988 3368.0122 3416.1717
  3583.285  3756.0027 3911.6643]
 [3595.8285 3585.3246 3360.4967 3335.8215 3312.727  3255.4027 3303.3737
  3464.1376 3631.7204 3783.285 ]
 [3392.6904 3384.3192 3174.7776 3148.0944 3126.3816 3073.6692 3116.964
  3270.     3427.0908 3568.878 ]
 [3458.1081 3448.9982 3233.9342 3208.7108 3186.342  3131.9908 3176.9399
  3332.01   3493.0276 3637.5752]
 [3387.8333 3378.7632 3168.3294 3143.2532 3121.5366 3068.2657 3112.4063
  3264.5992 3421.9367 3564.0835]
 [3478.318  3469.046  3252.1663 3227.5485 3204.8906 3150.0459 3195.457
  3351.0376 3513.4454 3658.6088]
 [3587.5821 3577.6888 3354.1456 3328.525  3305.425  3248.7103 3295.8567
  3456.5956 3623.6199 3774.1931]
 [3782.1961 3772.3736 3537.3438 3509.5092 3485.0318 3425.7029 3474.6919
  3644.3812 3820.4427 3978.3859]
 [3915.0043 3904.4672 3660.1961 3632.7021 3607.1972 3545.3782 3596.6185
  3771.6478 3954.5059 4117.9791]]

Matrix Transpose:
[[801.   802.   803.   804.   805.   806.   807.   808.   809.   810.
]
 [ 43.05  43.47  42.24  39.24  40.9   39.47  41.68  42.19  44.75
46.95]
 [ 27.79  28.52  28.16  26.16  26.03  26.31  25.63  27.61  28.35
28.88]
 [ 28.7   28.98  28.16  26.16  27.27  26.31  27.79  28.13  29.83  31.3
]
 [ 27.79  27.89  25.63  26.16  25.65  25.21  25.46  26.21  28.21
28.53]]

Horizontal Stack:
[[801.    43.05  27.79  28.7   27.79 801.    28.48  34.18  30.56
22.23]
 [802.    43.47  28.52  28.98  27.89 802.    28.1   33.72  30.68
22.82]
 [803.    42.24  28.16  28.16  25.63 803.    26.16  31.39  28.2
22.53]
 [804.    39.24  26.16  26.16  26.16 804.    26.16  31.39  28.78
20.93]
 [805.    40.9   26.03  27.27  25.65 805.    26.1   31.32  28.22
20.82]
 [806.    39.47  26.31  26.31  25.21 806.    25.45  30.54  27.73
21.05]
 [807.    41.68  25.63  27.79  25.46 807.    26.16  31.39  28.01
20.51]
```

```
 [808.    42.19  27.61  28.13  26.21 808.    27.44  32.93  28.83
22.08]
 [809.    44.75  28.35  29.83  28.21 809.    28.63  34.35  31.03
22.68]
 [810.    46.95  28.88  31.3   28.53 810.    30.35  36.42  31.38  23.1
]]

Vertical Stack:
[[801.    43.05  27.79  28.7   27.79]
 [802.    43.47  28.52  28.98  27.89]
 [803.    42.24  28.16  28.16  25.63]
 [804.    39.24  26.16  26.16  26.16]
 [805.    40.9   26.03  27.27  25.65]
 [806.    39.47  26.31  26.31  25.21]
 [807.    41.68  25.63  27.79  25.46]
 [808.    42.19  27.61  28.13  26.21]
 [809.    44.75  28.35  29.83  28.21]
 [810.    46.95  28.88  31.3   28.53]
 [801.    28.48  34.18  30.56  22.23]
 [802.    28.1   33.72  30.68  22.82]
 [803.    26.16  31.39  28.2   22.53]
 [804.    26.16  31.39  28.78  20.93]
 [805.    26.1   31.32  28.22  20.82]
 [806.    25.45  30.54  27.73  21.05]
 [807.    26.16  31.39  28.01  20.51]
 [808.    27.44  32.93  28.83  22.08]
 [809.    28.63  34.35  31.03  22.68]
 [810.    30.35  36.42  31.38  23.1 ]]

Custom Sequence:
[10 20 30 40 50]

Mean:
186.03499999999997

Standard Deviation:
309.7929965912722

Minimum:
25.21

Maximum:
810.0

Square Root:
[[28.3019434   6.56124988  5.27162214  5.35723809  5.27162214]
 [28.31960452  6.59317829  5.34041197  5.38330753  5.28109837]
 [28.33725463  6.49923072  5.30659966  5.30659966  5.06260802]
 [28.35489376  6.26418391  5.11468474  5.11468474  5.11468474]
 [28.37252192  6.39531078  5.10196041  5.22206856  5.0645829 ]
 [28.39013913  6.28251542  5.12932744  5.12932744  5.02095608]
 [28.40774542  6.45600496  5.06260802  5.27162214  5.04579032]
 [28.42534081  6.49538298  5.25452186  5.30377224  5.11957029]
 [28.44292531  6.68954408  5.3244718   5.46168472  5.31130869]
 [28.46049894  6.85200701  5.37401154  5.59464029  5.34134814]]

Exponential:
[[           inf 4.97024098e+18 1.17231319e+12 2.91240408e+12
```

```
  1.17231319e+12]
 [           inf 7.56451570e+18 2.43264437e+12 3.85348866e+12
  1.29560645e+12]
 [           inf 2.21105179e+18 1.69719839e+12 1.69719839e+12
  1.35197161e+11]
 [           inf 1.10081787e+17 2.29690824e+11 2.29690824e+11
  2.29690824e+11]
 [           inf 5.78954335e+17 2.01690463e+11 6.96964281e+11
  1.37928325e+11]
 [           inf 1.38548938e+17 2.66862665e+11 2.66862665e+11
  8.88308645e+10]
 [           inf 1.26297282e+18 1.35197161e+11 1.17231319e+12
  1.14061088e+11]
 [           inf 2.10321752e+18 9.79198288e+11 1.64703859e+12
  2.41467325e+11]
 [           inf 2.72068377e+19 2.05233647e+12 9.01580262e+12
  1.78421561e+12]
 [           inf 2.45542077e+20 3.48678073e+12 3.92118456e+13
  2.45709285e+12]]

Bitwise AND:
[[801   8   2  28  18]
 [802   8   0  28  18]
 [803  10  28  28  16]
 [804   2  26  24  16]
 [805   8  26  24  16]
 [806   1  26  26  17]
 [807   8  25  24  16]
 [808  10   0  28  18]
 [809  12   0  29  20]
 [810  14   4  31  20]]

Bitwise OR:
[[801  63  59  30  31]
 [802  63  61  30  31]
 [803  58  31  28  31]
 [804  63  31  30  30]
 [805  58  31  31  29]
 [806  63  30  27  29]
 [807  59  31  31  29]
 [808  59  59  28  30]
 [809  60  62  31  30]
 [810  62  60  31  31]]

Copied Array:
[[801.    43.05  27.79  28.7   27.79]
 [802.    43.47  28.52  28.98  27.89]
 [803.    42.24  28.16  28.16  25.63]
 [804.    39.24  26.16  26.16  26.16]
 [805.    40.9   26.03  27.27  25.65]
 [806.    39.47  26.31  26.31  25.21]
 [807.    41.68  25.63  27.79  25.46]
 [808.    42.19  27.61  28.13  26.21]
 [809.    44.75  28.35  29.83  28.21]
 [810.    46.95  28.88  31.3   28.53]]

View Array:
[[801.    43.05  27.79  28.7   27.79]
```

```
 [802.    43.47  28.52  28.98  27.89]
 [803.    42.24  28.16  28.16  25.63]
 [804.    39.24  26.16  26.16  26.16]
 [805.    40.9   26.03  27.27  25.65]
 [806.    39.47  26.31  26.31  25.21]
 [807.    41.68  25.63  27.79  25.46]
 [808.    42.19  27.61  28.13  26.21]
 [809.    44.75  28.35  29.83  28.21]
 [810.    46.95  28.88  31.3   28.53]]

Data Stack:
[[801.    43.05  27.79  28.7   27.79 801.    28.48  34.18  30.56
22.23]
 [802.    43.47  28.52  28.98  27.89 802.    28.1   33.72  30.68
22.82]
 [803.    42.24  28.16  28.16  25.63 803.    26.16  31.39  28.2
22.53]
 [804.    39.24  26.16  26.16  26.16 804.    26.16  31.39  28.78
20.93]
 [805.    40.9   26.03  27.27  25.65 805.    26.1   31.32  28.22
20.82]
 [806.    39.47  26.31  26.31  25.21 806.    25.45  30.54  27.73
21.05]
 [807.    41.68  25.63  27.79  25.46 807.    26.16  31.39  28.01
20.51]
 [808.    42.19  27.61  28.13  26.21 808.    27.44  32.93  28.83
22.08]
 [809.    44.75  28.35  29.83  28.21 809.    28.63  34.35  31.03
22.68]
 [810.    46.95  28.88  31.3   28.53 810.    30.35  36.42  31.38  23.1
]]

Index of 40.9 in data1:
(array([4]), array([1]))

Sorted Data:
[[801.    39.24  25.63  26.16  25.21]
 [802.    39.47  26.03  26.31  25.46]
 [803.    40.9   26.16  27.27  25.63]
 [804.    41.68  26.31  27.79  25.65]
 [805.    42.19  27.61  28.13  26.16]
 [806.    42.24  27.79  28.16  26.21]
 [807.    43.05  28.16  28.7   27.79]
 [808.    43.47  28.35  28.98  27.89]
 [809.    44.75  28.52  29.83  28.21]
 [810.    46.95  28.88  31.3   28.53]]

Unique Values and Counts:
[39.24 39.47 40.9  41.68 42.19 42.24 43.05 43.47 44.75 46.95] [1 1 1 1
1 1 1 1 1 1]

Broadcasted Array:
[[811.    53.05  37.79  38.7   37.79]
 [812.    53.47  38.52  38.98  37.89]
 [813.    52.24  38.16  38.16  35.63]
 [814.    49.24  36.16  36.16  36.16]
 [815.    50.9   36.03  37.27  35.65]
 [816.    49.47  36.31  36.31  35.21]
```

```
[817.     51.68   35.63   37.79   35.46]
[818.     52.19   37.61   38.13   36.21]
[819.     54.75   38.35   39.83   38.21]
[820.     56.95   38.88   41.3    38.53]]
```