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ROLL NO: 569

DIV: E4

```
import csv
import numpy as np
array = np.loadtxt('/content/testmarks1.csv',
delimiter=',',dtype=float,skiprows=1)
print(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]]
```

```
# Transpose the matrix
transpose_array = np.transpose(array)
print(transpose_array)
```

```
[[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]]
```

0s

```
#Random matrix of the same shape as the array
random_matrix = np.random.random(array[:, 1:].shape)
print("Random matrix:\n", random_matrix)
```

```
Random matrix:
 [[0.56631328 0.21551628 0.68454243 0.22818798]
 [0.78143198 0.93264469 0.86719966 0.9813187 ]
 [0.69833567 0.51174533 0.27634833 0.15864249]
 [0.62862734 0.14174014 0.23138864 0.89985346]
 [0.98978917 0.19454841 0.30928277 0.82089845]
 [0.24945028 0.70438855 0.97138954 0.32778541]
 [0.95624127 0.174448   0.98845587 0.79013429]
 [0.33147007 0.77828972 0.74201058 0.17613757]
 [0.95529652 0.0041208  0.51281124 0.97117346]
 [0.09680881 0.81611902 0.59478513 0.81318438]]
```

```
#Maximum marks in each subject
max_marks = np.max(array[:, 1:], axis=0)
print("Maximum marks in each subject:", max_marks)
```

Maximum marks in each subject: [46.95 28.88 31.3 28.53]

---

[8]

0s

```
#Minimum marks in each subject
min_marks = np.min(array[:, 1:], axis=0)
print("Minimum marks in each subject:", min_marks)
```

```
Minimum marks in each subject: [39.24 25.63 26.16 25.21]
```

```
#Maximum marks in EDS
max_marks_eds = np.max(array[:, 0], axis=0)
print("Maximum marks in EDS:", max_marks_eds)
```

```
Maximum marks in EDS: 810.0
```

```
#Maximum marks in SON
max_marks_son = np.max(array[:, 1], axis=0)
print("Maximum marks in SON:", max_marks_son)
```

Maximum marks in SON: 46.95

```
#sum of marks in each row
sum_marks_per_row = np.sum(array[:, 1:], axis=1)
print(sum_marks_per_row)
```

[127.33 128.86 124.19 117.72 119.85 117.3 120.56 124.14 131.14 135.66]

```
#element-wise rounding of marks to the nearest integer
rounded_marks = np.round(array[:, 1:])
print("Rounded marks:\n", rounded_marks)
```

```
Rounded marks:
 [[43. 28. 29. 28.]
 [43. 29. 29. 28.]
 [42. 28. 28. 26.]
 [39. 26. 26. 26.]
 [41. 26. 27. 26.]
 [39. 26. 26. 25.]
 [42. 26. 28. 25.]
 [42. 28. 28. 26.]
 [45. 28. 30. 28.]
 [47. 29. 31. 29.]]
```

```
#The exponential of each mark
exponential_marks = np.exp(array[:, 1:])
print("Exponential of each mark:\n", exponential_marks)
```

```
Exponential of each mark:
 [[4.97024098e+18 1.17231319e+12 2.91240408e+12 1.17231319e+12]
 [7.56451570e+18 2.43264437e+12 3.85348866e+12 1.29560645e+12]
 [2.21105179e+18 1.69719839e+12 1.69719839e+12 1.35197161e+11]
 [1.10081787e+17 2.29690824e+11 2.29690824e+11 2.29690824e+11]
 [5.78954335e+17 2.01690463e+11 6.96964281e+11 1.37928325e+11]
 [1.38548938e+17 2.66862665e+11 2.66862665e+11 8.88308645e+10]
 [1.26297282e+18 1.35197161e+11 1.17231319e+12 1.14061088e+11]
 [2.10321752e+18 9.79198288e+11 1.64703859e+12 2.41467325e+11]
 [2.72068377e+19 2.05233647e+12 9.01580262e+12 1.78421561e+12]
 [2.45542077e+20 3.48678073e+12 3.92118456e+13 2.45709285e+12]]
```

```
# Cumulative sum of marks in each subject
cumulative_sum_subjects = np.cumsum(array[:, 1:], axis=0)
print("Cumulative sum of marks in each subject:\n",
cumulative_sum_subjects)
```

```
Cumulative sum of marks in each subject:
 [[ 43.05  27.79  28.7   27.79]
 [ 86.52  56.31  57.68  55.68]
 [128.76  84.47  85.84  81.31]
 [168.   110.63 112.   107.47]
 [208.9  136.66 139.27 133.12]
 [248.37 162.97 165.58 158.33]
 [290.05 188.6  193.37 183.79]
 [332.24 216.21 221.5  210.  ]
 [376.99 244.56 251.33 238.21]
 [423.94 273.44 282.63 266.74]]
```

```
#square root of each mark
square_root_marks = np.sqrt(array[:, 1:])
print("Square root of each mark:\n", square_root_marks)
```

```
Square root of each mark:
 [[6.56124988 5.27162214 5.35723809 5.27162214]
 [6.59317829 5.34041197 5.38330753 5.28109837]
 [6.49923072 5.30659966 5.30659966 5.06260802]
 [6.26418391 5.11468474 5.11468474 5.11468474]
 [6.39531078 5.10196041 5.22206856 5.0645829 ]
 [6.28251542 5.12932744 5.12932744 5.02095608]
 [6.45600496 5.06260802 5.27162214 5.04579032]
 [6.49538298 5.25452186 5.30377224 5.11957029]
 [6.68954408 5.3244718  5.46168472 5.31130869]
 [6.85200701 5.37401154 5.59464029 5.34134814]]
```

```
#Maximum marks in DT
max_marks_dt = np.max(array[:, 2], axis=0)
print("Maximum marks in DT:", max_marks_dt)
```

```
Maximum marks in DT: 28.88
```

```
#Maximum marks in ET
max_marks_et = np.max(array[:, 3], axis=0)
```

```
print("Maximum marks in ET:", max_marks_et)
```

Maximum marks in ET: 31.3

```
#Minimum marks in DT
min_marks_dt = np.min(array[:, 2], axis=0)
print("Minimum marks in DT:", min_marks_dt)
```

```
Minimum marks in DT: 25.63
```

```
#Minimum marks in ET
min_marks_et = np.min(array[:, 3], axis=0)
print("Minimum marks in ET:", min_marks_et)
```

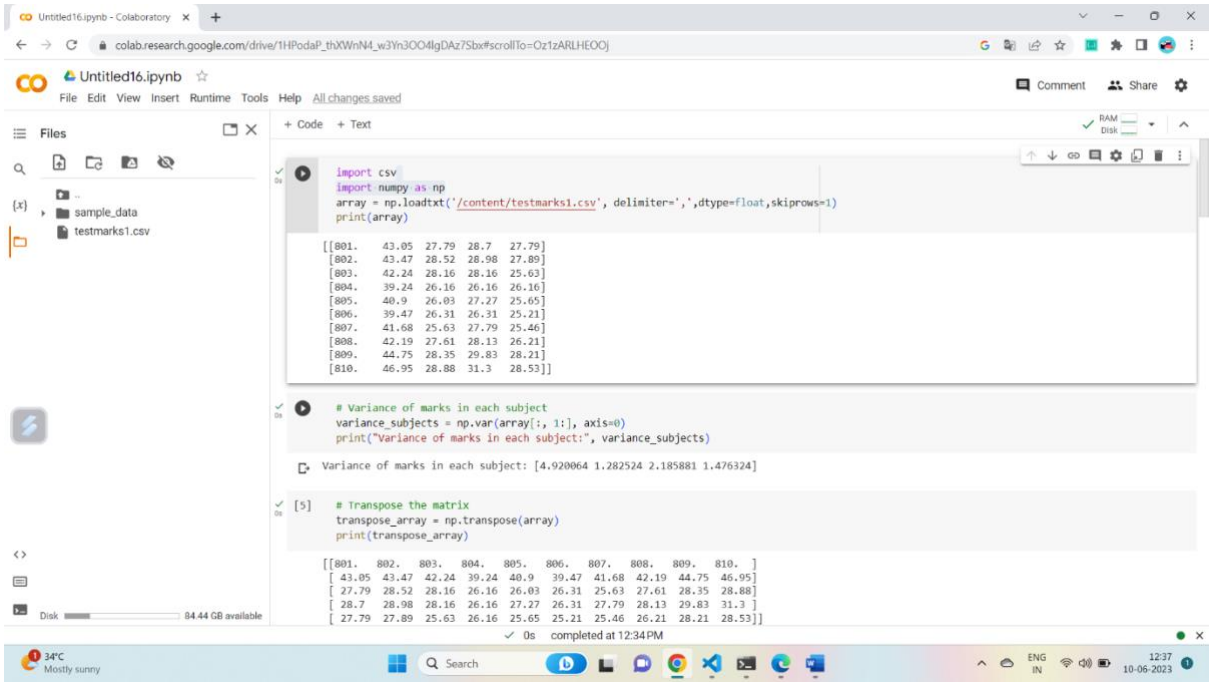
```
Minimum marks in ET: 26.16
```

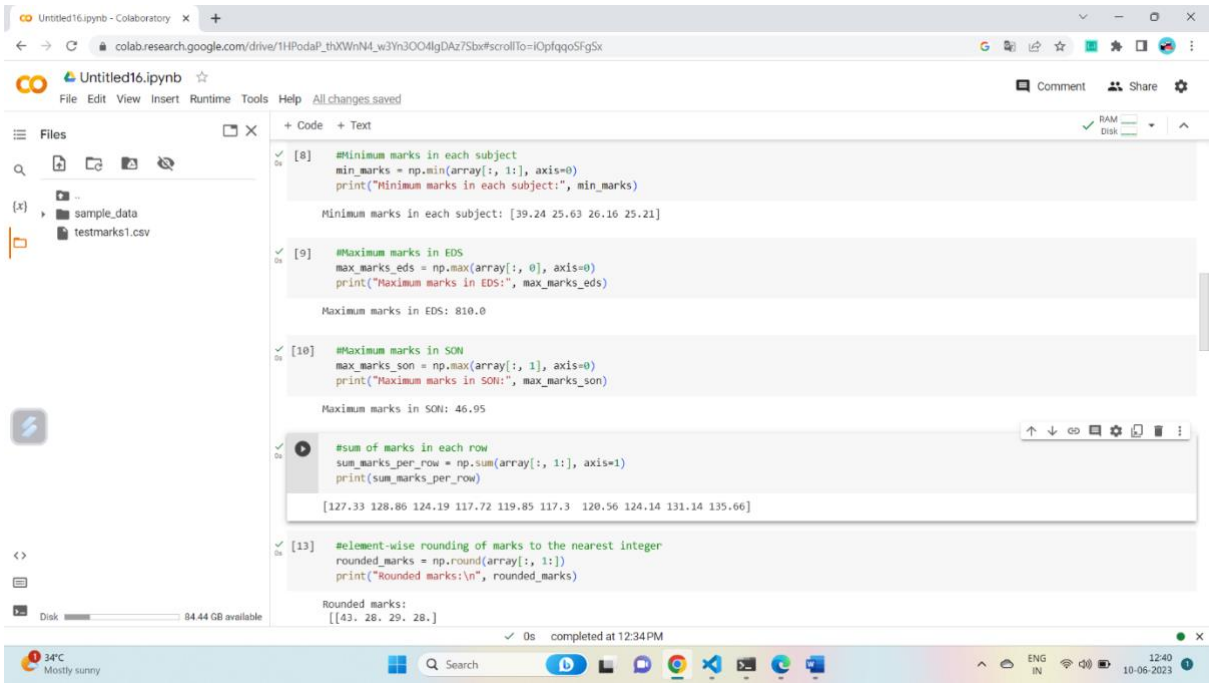
```
#Mean of marks in each subject
mean_subjects = np.mean(array[:, 1:], axis=0)
print("Mean of marks in each subject:", mean_subjects)
```

Mean of marks in each subject: [42.394 27.344 28.263 26.674]

```
# Variance of marks in each subject
variance_subjects = np.var(array[:, 1:], axis=0)
print("Variance of marks in each subject:", variance_subjects)
```

```
Variance of marks in each subject: [4.920064 1.282524 2.185881
1.476324].
```

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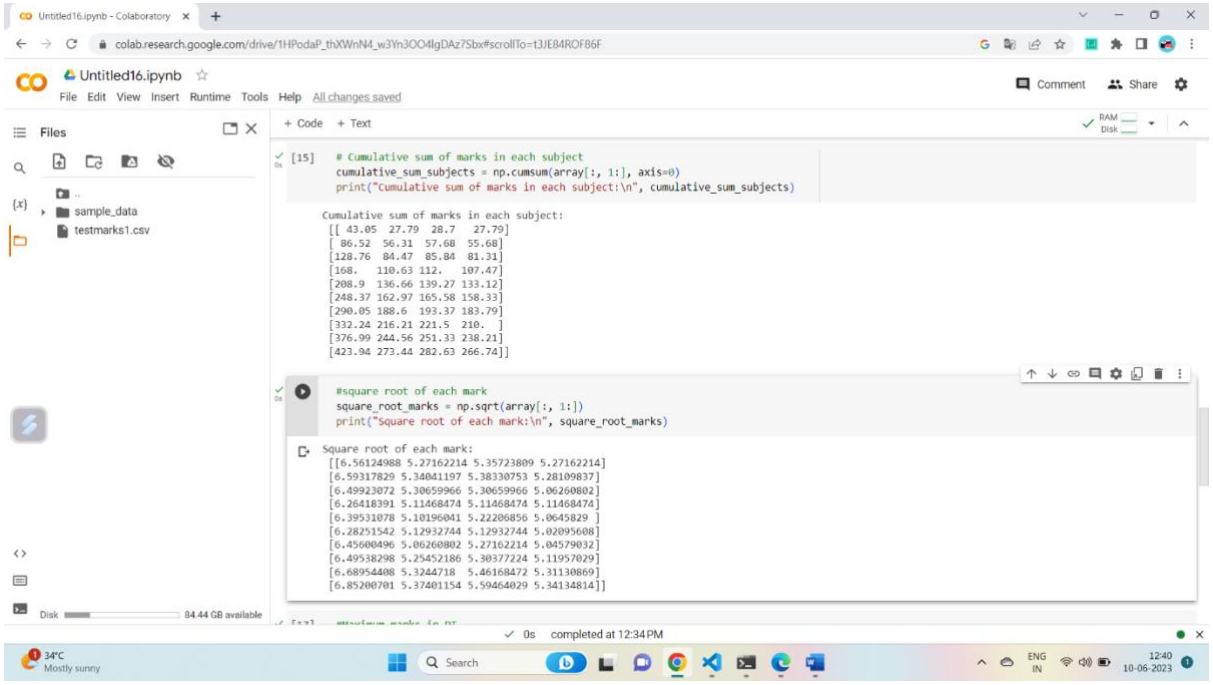
Untitled16.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
sample_data
testmarks1.csv
+ Code + Text
[8] #Minimum marks in each subject
min_marks = np.min(array[:, 1:], axis=0)
print("Minimum marks in each subject:", min_marks)
Minimum marks in each subject: [39.24 25.63 26.16 25.21]
[9] #Maximum marks in EDS
max_marks_eds = np.max(array[:, 0], axis=0)
print("Maximum marks in EDS:", max_marks_eds)
Maximum marks in EDS: 810.0
[10] #Maximum marks in SON
max_marks_son = np.max(array[:, 1], axis=0)
print("Maximum marks in SON:", max_marks_son)
Maximum marks in SON: 46.95
#sum of marks in each row
sum_marks_per_row = np.sum(array[:, 1:], axis=1)
print(sum_marks_per_row)
[127.33 128.86 124.19 117.72 119.85 117.3 120.56 124.14 131.14 135.66]
[13] #element-wise rounding of marks to the nearest integer
rounded_marks = np.round(array[:, 1:])
print("Rounded marks:\n", rounded_marks)
Rounded marks:
[[43. 28. 29. 28.]
Disk 84.44 GB available
0s completed at 12:34 PM
34°C Mostly sunny
Search
ENG IN
12:40 10-06-2023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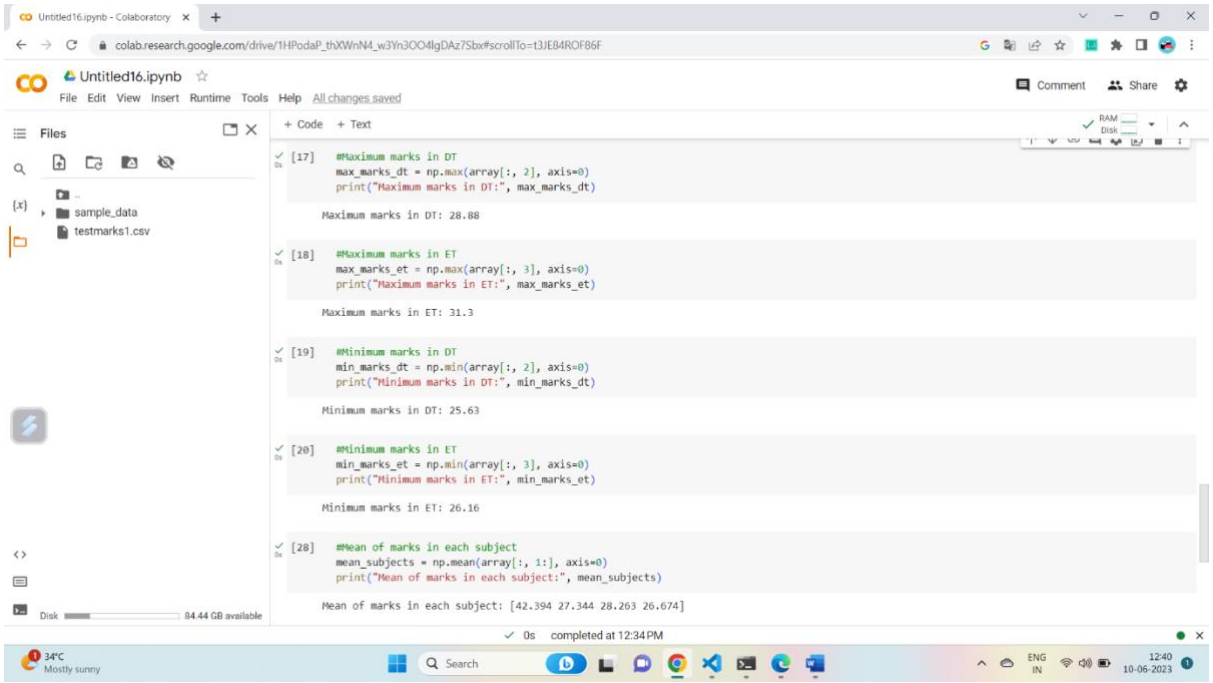
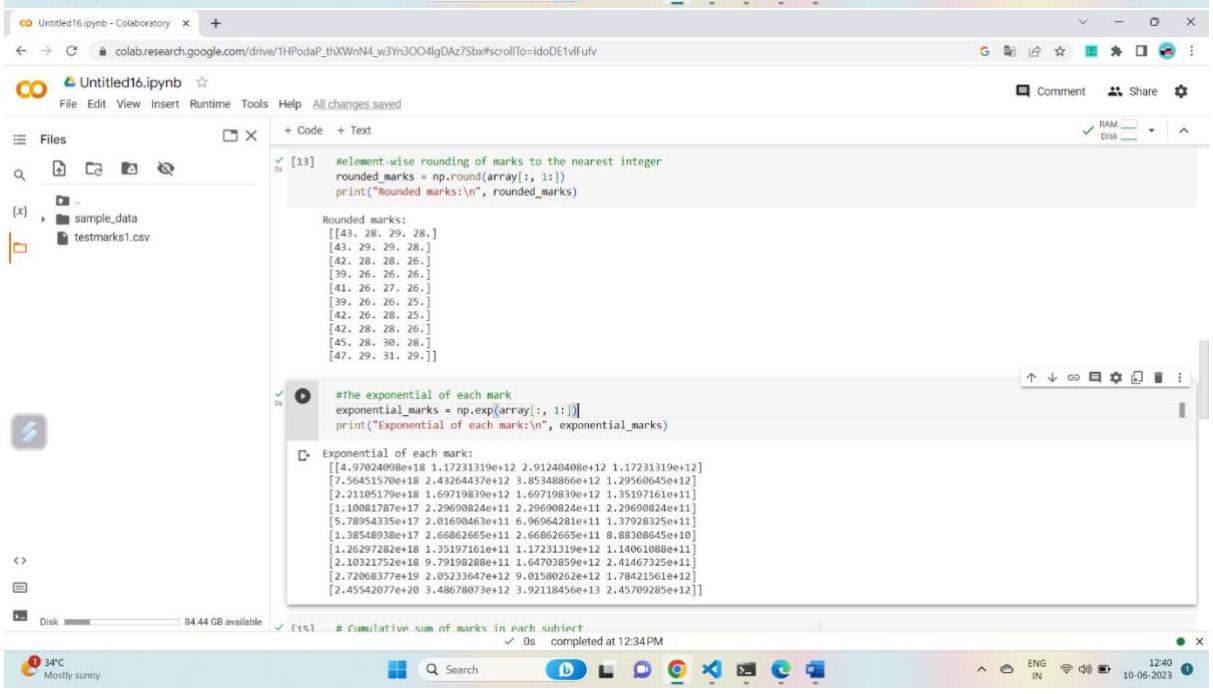
colab.research.google.com/drive/1HPodaP_thXWnN4_w3Yn3OO4IgDAz7Sbx#scrollTo=t3JE84ROF86F
Untitled16.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
sample_data
testmarks1.csv
+ Code + Text
[15] # Cumulative sum of marks in each subject
cumulative_sum_subjects = np.cumsum(array[:, 1:], axis=0)
print("Cumulative sum of marks in each subject:\n", cumulative_sum_subjects)
Cumulative sum of marks in each subject:
[[43.05 27.79 28.7 27.79]
[86.52 56.31 57.68 55.68]
[128.76 84.47 85.84 81.31]
[168. 110.63 112. 107.47]
[208.9 136.66 139.27 133.12]
[248.37 162.97 165.58 158.33]
[290.05 188.6 193.37 183.79]
[332.24 216.21 221.5 210.]
[376.99 244.56 251.33 238.21]
[423.94 273.44 282.63 266.74]]
#square root of each mark
square_root_marks = np.sqrt(array[:, 1:])
print("Square root of each mark:\n", square_root_marks)
Square root of each mark:
[[6.56124988 5.27162214 5.35723809 5.27162214]
[6.59317829 5.34041197 5.38330753 5.28109837]
[6.49923072 5.30659966 5.30659966 5.06260802]
[6.26418391 5.11468474 5.11468474 5.11468474]
[6.39531078 5.10196041 5.22206856 5.0645829]
[6.28251542 5.12932744 5.12932744 5.02095608]
[6.45600496 5.06260802 5.27162214 5.04579032]
[6.49538298 5.25452186 5.30377224 5.11957029]
[6.68954408 5.3244718 5.46168472 5.31130869]
[6.85200701 5.37401154 5.59464029 5.34134814]]
Disk 84.44 GB available
0s completed at 12:34 PM
34°C Mostly sunny
Search
ENG IN
12:40 10-06-2023



```
[17]  #Maximum marks in DT
      max_marks_dt = np.max(array[:, 2], axis=0)
      print("Maximum marks in DT:", max_marks_dt)

Maximum marks in DT: 28.88

[18]  #Maximum marks in ET
      max_marks_et = np.max(array[:, 3], axis=0)
      print("Maximum marks in ET:", max_marks_et)

Maximum marks in ET: 31.3

[19]  #Minimum marks in DT
      min_marks_dt = np.min(array[:, 2], axis=0)
      print("Minimum marks in DT:", min_marks_dt)

Minimum marks in DT: 25.63

[20]  #Minimum marks in ET
      min_marks_et = np.min(array[:, 3], axis=0)
      print("Minimum marks in ET:", min_marks_et)

Minimum marks in ET: 26.16

[28]  #Mean of marks in each subject
      mean_subjects = np.mean(array[:, 1:], axis=0)
      print("Mean of marks in each subject:", mean_subjects)

Mean of marks in each subject: [42.394 27.344 28.263 26.674]
```



```
[13]  #element-wise rounding of marks to the nearest integer
      rounded_marks = np.round(array[:, 1:])
      print("Rounded marks:\n", rounded_marks)

Rounded marks:
 [[43. 28. 29. 28.]
 [43. 29. 29. 28.]
 [42. 28. 28. 26.]
 [39. 26. 26. 26.]
 [41. 26. 27. 26.]
 [39. 26. 26. 25.]
 [42. 26. 28. 25.]
 [42. 28. 28. 26.]
 [45. 28. 30. 28.]
 [47. 29. 31. 29.]]

      #The exponential of each mark
      exponential_marks = np.exp(array[:, 1:])
      print("Exponential of each mark:\n", exponential_marks)

Exponential of each mark:
 [[4.97024098e+18 1.17231319e+12 2.91240408e+12 1.17231319e+12]
 [7.56451570e+18 2.43264437e+12 3.85348866e+12 1.29560645e+12]
 [2.21105179e+18 1.69719839e+12 1.69719839e+12 1.35197161e+11]
 [1.10081787e+17 2.29690824e+11 2.29690824e+11 2.29690824e+11]
 [5.78954335e+17 2.01690463e+11 6.96964281e+11 1.37928325e+11]
 [1.38548938e+17 2.66862665e+11 2.66862665e+11 8.88308645e+10]
 [1.26297282e+18 1.35197161e+11 1.17231319e+12 1.14061088e+11]
 [2.10321752e+18 9.79198288e+11 1.64703859e+12 2.41467325e+11]
 [2.72068377e+19 2.05233647e+12 9.01580262e+12 1.78421561e+12]
 [2.45542077e+20 3.48678073e+12 3.92118456e+13 2.45709285e+12]]

[15]  # Cumulative sum of marks in each subject
```