ASSIGNMENT

A chocolate factory is packing chocolates into the sachets. The chocolate packets here
represent an array of N number of integer values. The task is to find the empty sachets(0)
of chocolate and push it to the end of the conveyor belt.

```
n=7
j=0
L=[0 for i in range(n)]
print("enter elements:")
for i in range(n):
    a=int(input())
    if a!=0:
        L[j]=a
        j+=1
for i in L:
    print(i,end=" ")
```

```
enter elements:
4
5
0
1
0
0
5
4 5 1 5 0 0 0
```

Python program to create Bank account class with both a deposit() and a withdraw() function.

```
class BankAccount:
    def __init__(self, balance=0):
        self.balance = balance

    def deposit(self, amount):
        self.balance += amount
        print(f"{amount}$ has been deposited. Your new balance is
{self.balance}$.")

    def withdraw(self, amount):
        if amount > self.balance:
            print("Insufficient funds.")
        else:

            self.balance -= amount
```

```
            print(f"{amount}$ has been withdrawn. Your new balance is
{self.balance}$.")
account = BankAccount(100)
account.deposit(75)
account.withdraw(25)
```

```
75$ has been deposited. Your new balance is 175$.
25$ has been withdrawn. Your new balance is 150$.
```

Importing data, Data Cleaning, Viewing/Inspecting Data, Data Selection, Statistics.

```
 import pandas as pd

df=pd.read_csv(r"C:\Users\aaroh\Downloads\winequality-red.csv")

df.head()
```

```
   fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
0            7.4              0.70         0.00             1.9
0.076
1            7.8              0.88         0.00             2.6
0.098
2            7.8              0.76         0.04             2.3
0.092
3           11.2              0.28         0.56             1.9
0.075
4            7.4              0.70         0.00             1.9
0.076

   free sulfur dioxide  total sulfur dioxide  density    pH  sulphates
\
0                 11.0                  34.0   0.9978  3.51       0.56

1                 25.0                  67.0   0.9968  3.20       0.68

2                 15.0                  54.0   0.9970  3.26       0.65

3                 17.0                  60.0   0.9980  3.16       0.58

4                 11.0                  34.0   0.9978  3.51       0.56


   alcohol  quality
0      9.4        5
1      9.8        5
2      9.8        5
3      9.8        6
4      9.4        5
```

```
df.head(n=10)
```

```
   fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
0            7.4              0.70         0.00             1.9
0.076
1            7.8              0.88         0.00             2.6
0.098
2            7.8              0.76         0.04             2.3
0.092
3           11.2              0.28         0.56             1.9
0.075
4            7.4              0.70         0.00             1.9
0.076
5            7.4              0.66         0.00             1.8
0.075
6            7.9              0.60         0.06             1.6
0.069
7            7.3              0.65         0.00             1.2
0.065
8            7.8              0.58         0.02             2.0
0.073
9            7.5              0.50         0.36             6.1
0.071

   free sulfur dioxide  total sulfur dioxide  density    pH  sulphates
\
0                 11.0                  34.0   0.9978  3.51       0.56

1                 25.0                  67.0   0.9968  3.20       0.68

2                 15.0                  54.0   0.9970  3.26       0.65

3                 17.0                  60.0   0.9980  3.16       0.58

4                 11.0                  34.0   0.9978  3.51       0.56

5                 13.0                  40.0   0.9978  3.51       0.56

6                 15.0                  59.0   0.9964  3.30       0.46

7                 15.0                  21.0   0.9946  3.39       0.47

8                  9.0                  18.0   0.9968  3.36       0.57

9                 17.0                 102.0   0.9978  3.35       0.80


   alcohol  quality
```

```
0      9.4        5
1      9.8        5
2      9.8        5
3      9.8        6
4      9.4        5
5      9.4        5
6      9.4        5
7     10.0        7
8      9.5        7
9     10.5        5
```

```
df.head(-3)
```

```
      fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
0               7.4              0.70         0.00             1.9
0.076
1               7.8              0.88         0.00             2.6
0.098
2               7.8              0.76         0.04             2.3
0.092
3              11.2              0.28         0.56             1.9
0.075
4               7.4              0.70         0.00             1.9
0.076
...             ...               ...          ...             ...
...
1591            5.4              0.74         0.09             1.7
0.089
1592            6.3              0.51         0.13             2.3
0.076
1593            6.8              0.62         0.08             1.9
0.068
1594            6.2              0.60         0.08             2.0
0.090
1595            5.9              0.55         0.10             2.2
0.062

      free sulfur dioxide  total sulfur dioxide  density    pH
sulphates  \
0                    11.0                  34.0  0.99780  3.51
0.56
1                    25.0                  67.0  0.99680  3.20
0.68
2                    15.0                  54.0  0.99700  3.26
0.65
3                    17.0                  60.0  0.99800  3.16
0.58
4                    11.0                  34.0  0.99780  3.51
0.56
```

```
...                   ...                   ...      ...   ...
...
1591                16.0                  26.0  0.99402  3.67
0.56
1592                29.0                  40.0  0.99574  3.42
0.75
1593                28.0                  38.0  0.99651  3.42
0.82
1594                32.0                  44.0  0.99490  3.45
0.58
1595                39.0                  51.0  0.99512  3.52
0.76

      alcohol  quality
0         9.4        5
1         9.8        5
2         9.8        5
3         9.8        6
4         9.4        5
...       ...      ...
1591     11.6        6
1592     11.0        6
1593      9.5        6
1594     10.5        5
1595     11.2        6

[1596 rows x 12 columns]
```

```
df.tail()
```

```
      fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
1594            6.2             0.600         0.08             2.0
0.090
1595            5.9             0.550         0.10             2.2
0.062
1596            6.3             0.510         0.13             2.3
0.076
1597            5.9             0.645         0.12             2.0
0.075
1598            6.0             0.310         0.47             3.6
0.067

      free sulfur dioxide  total sulfur dioxide  density    pH
sulphates  \
1594                 32.0                  44.0  0.99490  3.45
0.58
1595                 39.0                  51.0  0.99512  3.52
0.76
1596                 29.0                  40.0  0.99574  3.42
```

```
0.75
1597                32.0                  44.0  0.99547  3.57
0.71
1598                18.0                  42.0  0.99549  3.39
0.66

      alcohol  quality
1594     10.5        5
1595     11.2        6
1596     11.0        6
1597     10.2        5
1598     11.0        6
```

```
df.tail(n=10)
```

```
      fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
1589            6.6             0.725         0.20             7.8
0.073
1590            6.3             0.550         0.15             1.8
0.077
1591            5.4             0.740         0.09             1.7
0.089
1592            6.3             0.510         0.13             2.3
0.076
1593            6.8             0.620         0.08             1.9
0.068
1594            6.2             0.600         0.08             2.0
0.090
1595            5.9             0.550         0.10             2.2
0.062
1596            6.3             0.510         0.13             2.3
0.076
1597            5.9             0.645         0.12             2.0
0.075
1598            6.0             0.310         0.47             3.6
0.067

      free sulfur dioxide  total sulfur dioxide  density    pH
sulphates  \
1589                 29.0                  79.0  0.99770  3.29
0.54
1590                 26.0                  35.0  0.99314  3.32
0.82
1591                 16.0                  26.0  0.99402  3.67
0.56
1592                 29.0                  40.0  0.99574  3.42
0.75
1593                 28.0                  38.0  0.99651  3.42
0.82
```

```
1594                32.0                 44.0  0.99490  3.45
0.58
1595                39.0                 51.0  0.99512  3.52
0.76
1596                29.0                 40.0  0.99574  3.42
0.75
1597                32.0                 44.0  0.99547  3.57
0.71
1598                18.0                 42.0  0.99549  3.39
0.66

      alcohol  quality
1589      9.2        5
1590     11.6        6
1591     11.6        6
1592     11.0        6
1593      9.5        6
1594     10.5        5
1595     11.2        6
1596     11.0        6
1597     10.2        5
1598     11.0        6
```

```
df.tail(-3)
```

```
      fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
3              11.2             0.280         0.56             1.9
0.075
4               7.4             0.700         0.00             1.9
0.076
5               7.4             0.660         0.00             1.8
0.075
6               7.9             0.600         0.06             1.6
0.069
7               7.3             0.650         0.00             1.2
0.065
...             ...               ...          ...             ...
...
1594            6.2             0.600         0.08             2.0
0.090
1595            5.9             0.550         0.10             2.2
0.062
1596            6.3             0.510         0.13             2.3
0.076
1597            5.9             0.645         0.12             2.0
0.075
1598            6.0             0.310         0.47             3.6
0.067
```

```
      free sulfur dioxide  total sulfur dioxide  density    pH
sulphates  \
3                    17.0                  60.0  0.99800  3.16
0.58
4                    11.0                  34.0  0.99780  3.51
0.56
5                    13.0                  40.0  0.99780  3.51
0.56
6                    15.0                  59.0  0.99640  3.30
0.46
7                    15.0                  21.0  0.99460  3.39
0.47
...                   ...                   ...      ...   ...
...
1594                 32.0                  44.0  0.99490  3.45
0.58
1595                 39.0                  51.0  0.99512  3.52
0.76
1596                 29.0                  40.0  0.99574  3.42
0.75
1597                 32.0                  44.0  0.99547  3.57
0.71
1598                 18.0                  42.0  0.99549  3.39
0.66

      alcohol  quality
3         9.8        6
4         9.4        5
5         9.4        5
6         9.4        5
7        10.0        7
...       ...      ...
1594     10.5        5
1595     11.2        6
1596     11.0        6
1597     10.2        5
1598     11.0        6

[1596 rows x 12 columns]
```

```
 df.index
```

```
RangeIndex(start=0, stop=1599, step=1)
```

```
 df.columns
```

```
Index(['fixed acidity', 'volatile acidity', 'citric acid', 'residual
sugar',
       'chlorides', 'free sulfur dioxide', 'total sulfur dioxide',
'density',
```

```
       'pH', 'sulphates', 'alcohol', 'quality'],
      dtype='object')
```

```
 df.dtypes
```

```
fixed acidity           float64
volatile acidity        float64
citric acid             float64
residual sugar          float64
chlorides               float64
free sulfur dioxide     float64
total sulfur dioxide    float64
density                 float64
pH                      float64
sulphates               float64
alcohol                 float64
quality                   int64
dtype: object
```

```
 df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1599 entries, 0 to 1598
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   fixed acidity         1599 non-null   float64
 1   volatile acidity      1599 non-null   float64
 2   citric acid           1599 non-null   float64
 3   residual sugar        1599 non-null   float64
 4   chlorides             1599 non-null   float64
 5   free sulfur dioxide   1599 non-null   float64
 6   total sulfur dioxide  1599 non-null   float64
 7   density               1599 non-null   float64
 8   pH                    1599 non-null   float64
 9   sulphates             1599 non-null   float64
 10  alcohol               1599 non-null   float64
 11  quality               1599 non-null   int64  
dtypes: float64(11), int64(1)
memory usage: 150.0 KB
```

```
 df[df['pH']>3.51]
```

```
      fixed acidity  volatile acidity  citric acid  residual sugar
chlorides  \
12              5.6             0.615         0.00             1.6
0.089
21              7.6             0.390         0.31             2.3
0.082
45              4.6             0.520         0.15             2.1
0.054
```

```
75              8.8             0.410         0.64             2.2
0.093
76              8.8             0.410         0.64             2.2
0.093
...             ...               ...          ...             ...
...
1582            6.1             0.715         0.10             2.6
0.053
1587            5.8             0.610         0.11             1.8
0.066
1591            5.4             0.740         0.09             1.7
0.089
1595            5.9             0.550         0.10             2.2
0.062
1597            5.9             0.645         0.12             2.0
0.075

      free sulfur dioxide  total sulfur dioxide  density    pH
sulphates  \
12                   16.0                  59.0  0.99430  3.58
0.52
21                   23.0                  71.0  0.99820  3.52
0.65
45                    8.0                  65.0  0.99340  3.90
0.56
75                    9.0                  42.0  0.99860  3.54
0.66
76                    9.0                  42.0  0.99860  3.54
0.66
...                   ...                   ...      ...   ...
...
1582                 13.0                  27.0  0.99362  3.57
0.50
1587                 18.0                  28.0  0.99483  3.55
0.66
1591                 16.0                  26.0  0.99402  3.67
0.56
1595                 39.0                  51.0  0.99512  3.52
0.76
1597                 32.0                  44.0  0.99547  3.57
0.71

      alcohol  quality
12        9.9        5
21        9.7        5
45       13.1        4
75       10.5        5
76       10.5        5
...       ...      ...
1582     11.9        5
```

```
1587     10.9        6
1591     11.6        6
1595     11.2        6
1597     10.2        5

[153 rows x 12 columns]
```

```
df.to_csv('output.csv')
```

```
df.to_excel('output.xlsx', sheet_name='Sheet1')
```

```
 df.describe()
```

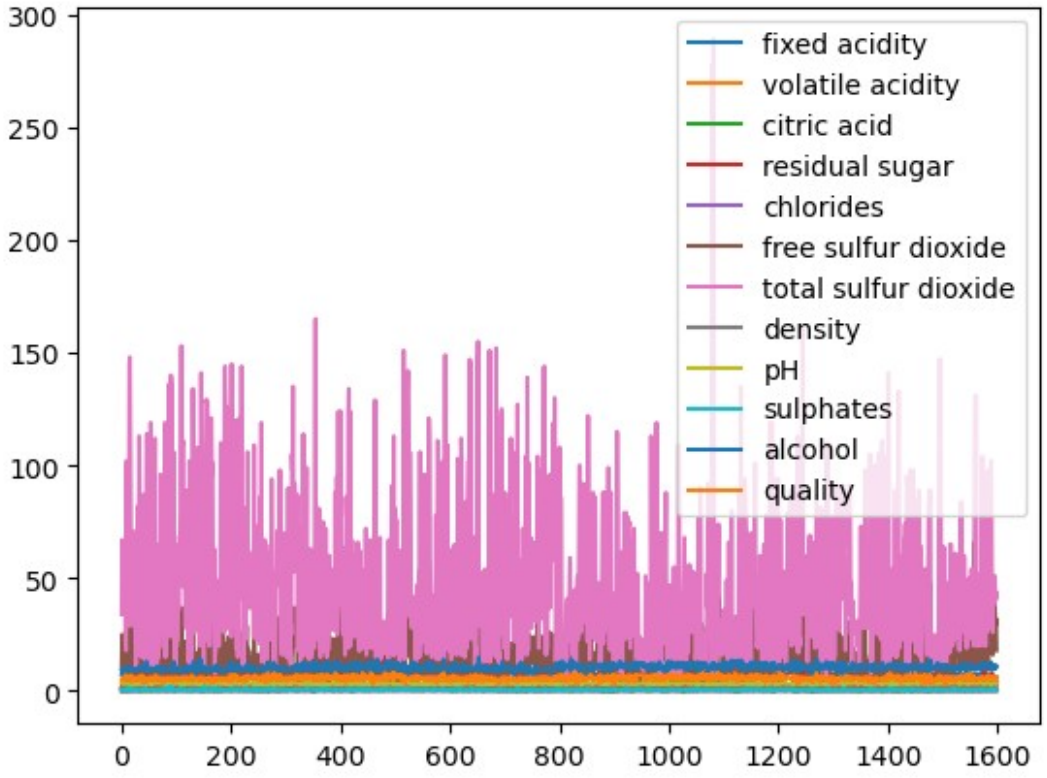
```
       fixed acidity  volatile acidity  citric acid  residual sugar  \
count    1599.000000       1599.000000  1599.000000     1599.000000
mean        8.319637          0.527821     0.270976        2.538806
std         1.741096          0.179060     0.194801        1.409928
min         4.600000          0.120000     0.000000        0.900000
25%         7.100000          0.390000     0.090000        1.900000
50%         7.900000          0.520000     0.260000        2.200000
75%         9.200000          0.640000     0.420000        2.600000
max        15.900000          1.580000     1.000000       15.500000

         chlorides  free sulfur dioxide  total sulfur dioxide
density  \
count  1599.000000          1599.000000           1599.000000
1599.000000
mean      0.087467            15.874922             46.467792
0.996747
std       0.047065            10.460157             32.895324
0.001887
min       0.012000             1.000000              6.000000
0.990070
25%       0.070000             7.000000             22.000000
0.995600
50%       0.079000            14.000000             38.000000
0.996750
75%       0.090000            21.000000             62.000000
0.997835
max       0.611000            72.000000            289.000000
1.003690

                pH    sulphates      alcohol      quality
count  1599.000000  1599.000000  1599.000000  1599.000000
mean      3.311113     0.658149    10.422983     5.636023
std       0.154386     0.169507     1.065668     0.807569
min       2.740000     0.330000     8.400000     3.000000
25%       3.210000     0.550000     9.500000     5.000000
50%       3.310000     0.620000    10.200000     6.000000
75%       3.400000     0.730000    11.100000     6.000000
max       4.010000     2.000000    14.900000     8.000000
```

```
df['pH'].mean()
```

```
3.3111131957473416
```

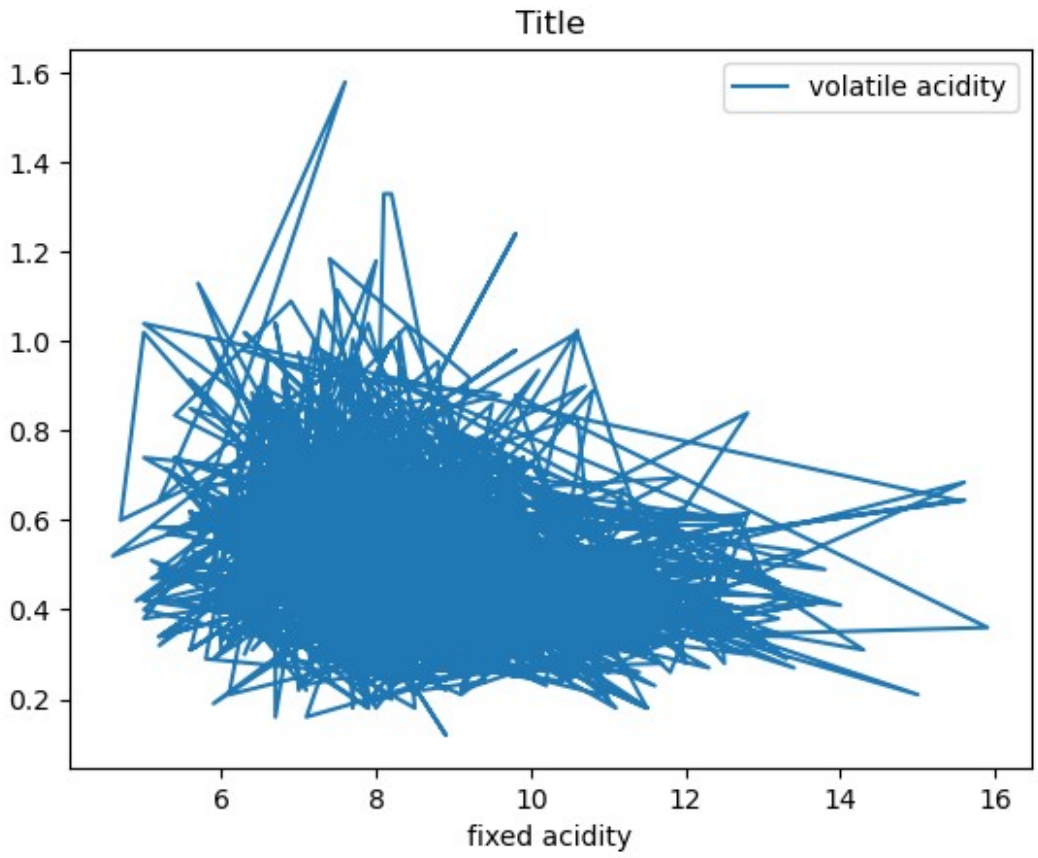
```
df.plot()
```

```
<Axes: >
```




```
  df.plot(x='fixed acidity', y='volatile acidity', title='Title')
```

```
<Axes: title={'center': 'Title'}, xlabel='fixed acidity'>
```



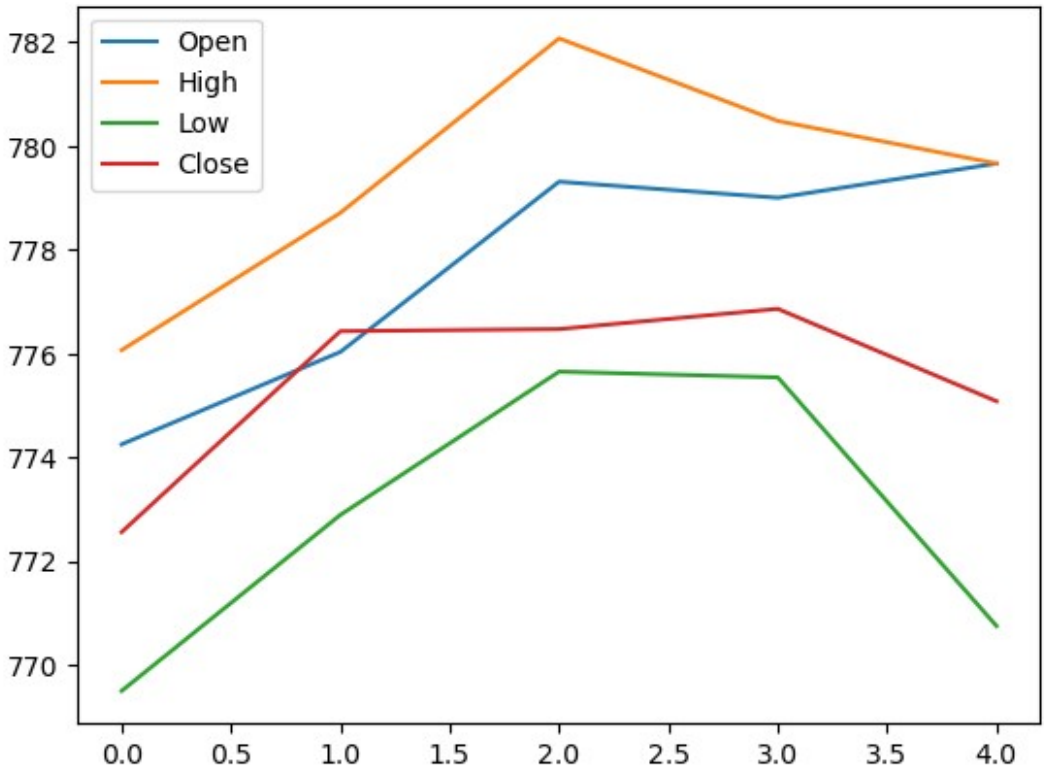
Write a NumPy program to calculate the difference between the maximum and the minimum values of a given array along the second axis

```
import numpy as np
arr = np.array([[10, 20, 30], [40, 5, 60], [70, 80, 90]])
# Calculate the difference between the maximum and minimum values
along the second axis
diff = np.max(arr, axis=1) - np.min(arr, axis=1)
print(diff)
```

```
[20 55 20]
```

Write a Python program to draw line charts of the financial data of Alphabet Inc. between October 3, 2016 to October 7, 2016.

```
import matplotlib.pyplot as plt
import pandas as pd
df = pd.read_csv(r"C:\Users\aaroh\OneDrive\Desktop\data.csv")
df.plot()
plt.show()
```


Open
High
Low
Close
782
780
778
776
774
772
770
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0