```
# 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
i = 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:
5
0
1
0
0
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print(f"{amount}$ has been withdrawn.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25$ has been withdrawn.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
             7.4
                               0.70
                                             0.00
                                                               1.9
0.076
             7.8
                               0.88
                                             0.00
                                                               2.6
1
0.098
             7.8
                               0.76
                                             0.04
                                                               2.3
2
0.092
                               0.28
                                             0.56
            11.2
                                                               1.9
0.075
             7.4
                               0.70
                                             0.00
                                                               1.9
0.076
   free sulfur dioxide total sulfur dioxide density
                                                           Hq
                                                                sulphates
\
                                                 0.9978 3.51
                   11.0
                                          34.0
                                                                     0.56
0
                  25.0
                                          67.0
                                                 0.9968 3.20
                                                                     0.68
1
2
                                          54.0
                  15.0
                                                 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
       9.4
0
       9.8
                   5
1
                   5
2
       9.8
                   6
3
       9.8
       9.4
                   5
```

df.head(n=10)

	d acidity	volat	ile aci	dity	citric	acid	resid	ual	sugar	
chloride 0	es \ 7.4			0.70		0.00			1.9	
0.076 1	7.8			0.88		0.00			2.6	
0.098	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	2.5			3.6						
\	sulfur di		total	sulfur						phates
0		11.0			34	.0 0	.9978	3.5	1	0.56
1		25.0			67	. 0 0	.9968	3.2	Θ	0.68
2		15.0			54	. 0 0	.9970	3.2	6	0.65
3		17.0			60	. 0 0	.9980	3.1	6	0.58
4		11.0			34	. 0 0	.9978	3.5	1	0.56
5		13.0			40	. 0 0	.9978	3.5	1	0.56
6		15.0			59	.0 0	.9964	3.3	0	0.46
7		15.0			21.	. 0 0	.9946	3.3	9	0.47
8		9.0			18	.0 0	.9968	3.3	6	0.57
9		17.0			102	. 0 0	.9978	3.3	5	0.80

0 1 2 3 4 5 6 7 8	9.4 9.8 9.8 9.4 9.4 9.4 10.0 9.5	5 5 6 5 5 7 7 5					
df.he	ead(-3)						
chloi	fixed rides \	acidity vo	latile ac	idity	citric ad	cid resid	ual sugar
0.076		7.4		0.70	0	.00	1.9
1		7.8		0.88	0	.00	2.6
0.098		7.8		0.76	0	. 04	2.3
0.092 3		11.2		0.28	0	.56	1.9
0.075 4 0.076		7.4		0.70	0	.00	1.9
	-						
1591	1	5.4		0.74	0	.09	1.7
0.089 1592		6.3		0.51	Θ.	. 13	2.3
0.076 1593		6.8		0.62	Θ.	. 08	1.9
0.068 1594		6.2		0.60	0	.08	2.0
0.090 1595 0.062		5.9		0.55	0	. 10	2.2
cul ni		ulfur dioxi	de total	sulfur	dioxide	density	рН
0	nates \	11	. 0		34.0	0.99780	3.51
0.56		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 0.76			39.0				51.0	0.99512	3.52	
0 1 2 3 4	alcohol 9.4 9.8 9.8 9.8 9.4	quali	5 5 5 6 5							
1591 1592 1593	11.6 11.0 9.5 10.5	·	 6 6 6 5							
1594 1595	11.2		6							
1595		2 colu								
1595	11.2 rows x 1	2 colu								
1595 [1596 df.ta:	<pre>11.2 rows x 1 il() fixed ac</pre>		mns]	ile aci	dity	citr	ic ac	id resid	ual sı	ıgar
1595 [1596 df.ta: chlor: 1594	<pre>11.2 rows x 1 il() fixed ac</pre>		mns]		dity .600	citr	ic ac		ual sı	ıgar 2.0
1595 [1596 df.ta: chlor: 1594 0.090 1595	<pre>11.2 rows x 1 il() fixed ac</pre>	idity	mns]	0		citr		08	ual sı	
1595 [1596 df.ta: chlor: 1594 0.090 1595 0.062 1596	<pre>11.2 rows x 1 il() fixed ac</pre>	idity 6.2	mns]	0	.600	citr	0.	08 10	ual sı	2.0
1595 [1596 df.ta: chlor: 1594 0.090 1595 0.062 1596 0.076 1597	<pre>11.2 rows x 1 il() fixed ac</pre>	idity 6.2 5.9	mns]	0 0 0	.600 .550	citr	0. 0.	08 10 13	ual sı	2.0
1595 [1596 df.ta: chlor: 1594 0.090 1595 0.062 1596 0.076	<pre>11.2 rows x 1 il() fixed ac</pre>	idity 6.2 5.9 6.3	mns]	9 9 9	.600 .550 .510	citr	0.0.	08 10 13 12	ual sı	2.02.22.3
1595 [1596 df.ta: chlor: 1594 0.090 1595 0.062 1596 0.076 1597 0.075 1598 0.067	<pre>11.2 rows x 1 il() fixed ac ides \</pre>	idity 6.2 5.9 6.3 5.9 6.0	mns] volat	9 9 9	.600 .550 .510 .645		0.0.0.0.	08 10 13 12 47	ual sı	2.0 2.2 2.3 2.0
1595 [1596 df.ta: chlor: 1594 0.090 1595 0.062 1596 0.076 1597 0.075 1598 0.067	<pre>11.2 rows x 1 il() fixed ac ides \</pre>	idity 6.2 5.9 6.3 5.9 6.0	mns] volat	9 9 9	.600 .550 .510 .645	r dio	0.0.0.0.	08 10 13 12 47		2.0 2.2 2.3 2.0
1595 [1596 df.ta: chlor: 1594 0.090 1595 0.062 1596 0.076 1597 0.075 1598 0.067	<pre>11.2 rows x 1 il() fixed ac ides \</pre>	idity 6.2 5.9 6.3 5.9 6.0	mns] volat oxide	9 9 9	.600 .550 .510 .645	r dio	0. 0. 0. 0. xide	08 10 13 12 47 density	рН 3.45	2.0 2.2 2.3 2.0

0.75 1597 0.71 1598 0.66				32.0 18.0				4.0 2.0			
1594 1595 1596 1597 1598		.5 .2 .0 .2	uali [.]	ty 5 6 6 5							
df.ta	df.tail(n=10)										
chlor	fixed ides		ity	volat	ile a	cidity	citri	c ac	id res	idual	sugar
1589 0.073		-	5.6			0.725		0.	20		7.8
1590 0.077		(5.3			0.550		0.	15		1.8
1591 0.089		ŗ	5.4			0.740		0.	09		1.7
1592		(5.3			0.510		0.	13		2.3
0.076 1593		(5.8			0.620		0.	08		1.9
0.068 1594		(5.2			0.600		0.	08		2.0
0.090 1595			5.9			0.550		0.	10		2.2
0.062 1596		(5.3			0.510		0.	13		2.3
0.076 1597		ŗ	5.9			0.645		0.	12		2.0
0.075 1598 0.067		(5.0			0.310		0.	47		3.6
			r di	oxide	tota	l sulfur	diox:	ide	densit	у	рН
sulph 1589	ates	\		29.0			79	9.0	0.9977	0 3.	29
0.54 1590				26.0			3!	5.0	0.9931	4 3.	32
0.82 1591				16.0			20	5.0	0.9940	2 3.	67
0.56 1592				29.0			40	9.0	0.9957	4 3.	42
0.75 1593 0.82				28.0			38	3.0	0.9965	1 3.	42

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	6 5			
1595	11.2	6			
1596	11.0	6			
1597	10.2	5			
1598	11.0	6			
JE 1-	.1 / . 1				

df.tail(-3)

	fixed acidity	volatile acidity	citric acid	residual sugar
chlori				
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	7.0	0.650	0.00	1.2
7	7.3	0.650	0.00	1.2
0.065				
150 <i>4</i>	6.2	0.600	0.00	2.0
1594	6.2	0.600	0.08	2.0
	5.0	0.550	0 10	2.2
	5.9	0.550	0.10	2.2
	6.3	0 510	0 13	2 3
	0.5	0.310	0.15	213
	5.9	0.645	0.12	2.0
	3.3	01015	0.12	210
	6.0	0.310	0.47	3.6
0.067				
0.090 1595 0.062 1596 0.076 1597 0.075 1598 0.067	5.9 6.3 5.9 6.0	0.550 0.510 0.645 0.310	0.10 0.13 0.12 0.47	2.2 2.3 2.0 3.6

```
free sulfur dioxide total sulfur dioxide density
                                                             На
sulphates \
                     17.0
                                            60.0 0.99800 3.16
0.58
                                            34.0 0.99780 3.51
                     11.0
0.56
                     13.0
                                            40.0 0.99780 3.51
5
0.56
                     15.0
                                            59.0 0.99640 3.30
6
0.46
7
                     15.0
                                            21.0 0.99460 3.39
0.47
. . .
                      . . .
                                             . . .
                                                      . . .
                                                           . . .
1594
                                            44.0 0.99490 3.45
                     32.0
0.58
                     39.0
                                            51.0 0.99512 3.52
1595
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
                     5
          9.4
          9.4
                     5
5
6
          9.4
                     5
7
                     7
         10.0
1594
         10.5
                     5
         11.2
                     6
1595
1596
         11.0
                     6
1597
         10.2
                     5
1598
         11.0
[1596 rows x 12 columns]
df.index
RangeIndex(start=0, stop=1599, step=1)
df.columns
Index(['fixed acidity', 'volatile acidity', 'citric acid', 'residual
        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
                        float64
density
                        float64
рН
                        float64
sulphates
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
                           1599 non-null
     chlorides
                                            float64
 5
     free sulfur dioxide
                           1599 non-null
                                            float64
 6
     total sulfur dioxide 1599 non-null
                                            float64
 7
     density
                            1599 non-null
                                            float64
 8
     На
                            1599 non-null
                                            float64
 9
     sulphates
                            1599 non-null
                                            float64
 10
    alcohol
                            1599 non-null
                                            float64
                            1599 non-null
 11
     quality
                                            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
                4.6
                                                                 2.1
45
                                 0.520
                                               0.15
0.054
```

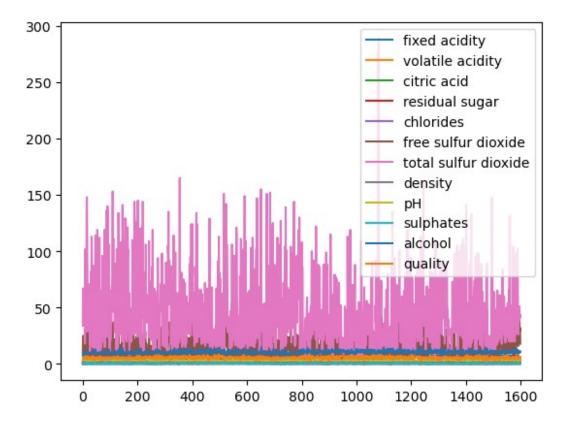
75 0.093		8.8	0.410	0.	64	2	.2
76		8.8	0.410	0.	64	2	.2
0.093							
1582		6.1	0.715	0.	10	2	.6
0.053 1587		5.8	0.610	Θ.	11	1	. 8
0.066 1591		5.4	0.740	Θ.	09	1	7
0.089 1595		5.9	0.550	0.	10	2	.2
0.062 1597		5.9	0.645	0.	12	2	.0
0.075							
sul nh	free sul ates \	fur dioxide	total sulfur	dioxide	density	рН	
12 0.52	ates (16.0		59.0	0.99430	3.58	
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							
12 21 45 75 76	alcohol 9.9 9.7 13.1 10.5 10.5	quality 5 5 4 5					
1582	11.9	5					

```
1587
         10.9
                      6
                      6
1591
         11.6
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
         1599.000000
                             1599.000000
                                           1599.000000
                                                            1599.000000
count
            8.319637
                                0.527821
                                              0.270976
                                                               2.538806
mean
std
            1.741096
                                0.179060
                                              0.194801
                                                               1.409928
                                              0.000000
min
            4.600000
                                0.120000
                                                               0.900000
25%
            7.100000
                                0.390000
                                              0.090000
                                                               1.900000
50%
            7.900000
                                0.520000
                                              0.260000
                                                               2.200000
                                              0.420000
75%
            9.200000
                                0.640000
                                                               2.600000
            15,900000
                                1.580000
                                              1.000000
                                                              15.500000
max
         chlorides
                     free sulfur dioxide
                                            total sulfur dioxide
density
       1599.000000
count
                              1599.000000
                                                      1599.000000
1599.000000
          0.087467
                                15.874922
                                                        46.467792
mean
0.996747
          0.047065
                                10.460157
                                                        32.895324
std
0.001887
min
          0.012000
                                 1.000000
                                                         6.000000
0.990070
          0.070000
                                 7,000000
                                                        22.000000
25%
0.995600
50%
          0.079000
                                14.000000
                                                        38.000000
0.996750
75%
          0.090000
                                21.000000
                                                        62.000000
0.997835
          0.611000
                                72.000000
                                                       289.000000
max
1.003690
                        sulphates
                 рΗ
                                        alcohol
                                                      quality
       1599.000000
                     1599.000000
                                   1599.000000
                                                 1599.000000
count
          3.311113
                        0.658149
                                     10.422983
                                                     5.636023
mean
std
          0.154386
                        0.169507
                                       1.065668
                                                     0.807569
min
          2.740000
                        0.330000
                                      8,400000
                                                     3,000000
25%
                        0.550000
                                      9.500000
                                                     5,000000
          3.210000
50%
          3.310000
                        0.620000
                                     10.200000
                                                     6.000000
75%
          3.400000
                        0.730000
                                     11.100000
                                                     6.000000
          4.010000
                        2,000000
                                     14.900000
                                                     8,000000
max
```

```
df['pH'].mean()
3.3111131957473416
```

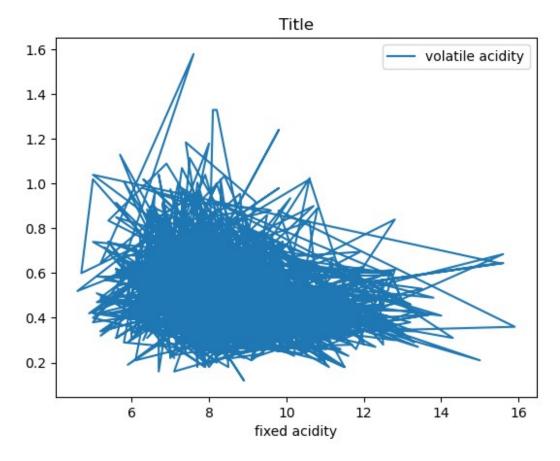
df.plot()

<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()
```

