In [10]:
```
import pandas as pd
import numpy as np
```

In [11]:
```
df1=pd.read_excel("FirstDecade.xlsx")
df1
```

Out[11]:

	Unnamed: 0	index	Date	Open	High	Low	Close	Volume	Divide
0	0	0	2002-08-12	27.785423	28.700244	27.785423	28.484993	212976	
1	1	1	2002-08-13	28.520869	28.978279	27.893051	28.099333	153576	
2	2	2	2002-08-14	28.162113	28.162113	25.632903	26.162066	822776	
3	3	3	2002-08-15	26.162066	26.162066	26.162066	26.162066	0	
4	4	4	2002-08-16	26.027532	27.265229	25.650840	26.099281	811856	
...	...	...	...	...	...	...	...	...	
2101	2101	2101	2010-12-24	445.953247	451.773468	442.708879	448.745361	1624640	
2102	2102	2102	2010-12-27	450.279002	455.961543	447.604837	448.784607	1664936	
2103	2103	2103	2010-12-28	448.784654	452.599274	448.332447	450.809937	1012876	
2104	2104	2104	2010-12-29	451.852203	456.964543	451.085372	454.978577	1042370	
2105	2105	2105	2010-12-30	453.228521	461.998168	453.228521	460.189148	3845552	

2106 rows × 10 columns

In [12]:
```
df2=pd.read_excel("SecondDecade.xlsx")
df2
```

Out[12]:

	Unnamed: 0	index	Date	Open	High	Low	Close	Volume	Di
0	0	0	2011-01-03	458.930670	462.843556	454.034643	455.411041	1405042	
1	1	1	2011-01-04	457.711602	458.596430	447.565558	450.180725	2502868	
2	2	2	2011-01-05	450.377174	458.497933	449.000775	455.764771	3069674	
3	3	3	2011-01-06	459.323930	464.829525	453.464394	460.778961	2846720	
4	4	4	2011-01-07	462.469711	466.736535	447.584960	449.354614	2532724	
...	...	...	...	...	...	...	...	...	
2457	2457	2457	2020-12-23	2750.536191	2791.611761	2740.398693	2781.809082	2790988	
2458	2458	2458	2020-12-24	2782.048726	2793.859855	2757.374613	2782.383545	1807144	
2459	2459	2459	2020-12-28	2783.004833	2820.972241	2775.353961	2801.558105	2108994	
2460	2460	2460	2020-12-29	2792.568581	2823.172072	2792.568581	2802.610352	1994151	
2461	2461	2461	2020-12-30	2806.339675	2819.059296	2775.353738	2782.335205	2637968	

2462 rows × 10 columns

In [13]:
```
df1=pd.read_excel("FirstDecade.xlsx",usecols=['Date','Open','High','Low','Clos
tcs_FirstDC=df1.to_numpy()
tcs_FirstDC
```

Out[13]:
```
array([[Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
        28.70024426553483, 27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [14]:
```
df2=pd.read_excel("SecondDecade.xlsx",usecols=['Date','Open','High','Low','Clo
tcs_SecondDC=df1.to_numpy()
tcs_SecondDC
```

Out[14]:
```
array([[Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
        28.70024426553483, 27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [15]:
```
tcs_FirstDC.shape
```

Out[15]:
```
(2106, 5)
```

In [16]:
```
tcs_SecondDC.shape
```

Out[16]:
```
(2106, 5)
```

In [17]:
```
tcs_SecondDC=tcs_SecondDC[0:2106,:]
```

In [18]:
```
tcs_SecondDC.shape
```

Out[18]:
```
(2106, 5)
```

In [19]:
```
result=tcs_FirstDC[:,4:5]+2
print(result)
result=np.add(tcs_FirstDC[:,1:2],2)
print(result)
```

```
[[30.48499298095703]
 [30.09933280944824]
 [28.16206550598145]
 ...
 [452.8099365234375]
 [456.9785766601562]
 [462.1891479492188]]
[[29.78542288474347]
 [30.52086875697312]
 [30.16211253034757]
 ...
 [450.7846543420418]
 [453.8522033325688]
 [455.2285208868343]]
```

In [20]:
```
result=np.add(tcs_FirstDC[:,1:2],tcs_SecondDC[:,1:2])
print(result)
```

```
[[55.57084576948694]
 [57.04173751394624]
 [56.32422506069514]
 ...
 [897.5693086840836]
 [903.7044066651376]
 [906.4570417736686]]
```

In [21]:
```
for i in range(tcs_FirstDC.shape[0]):
    if tcs_FirstDC[i,4]-tcs_FirstDC[i,1]>0:
        print(tcs_FirstDC[i,0],"-->","Stock Price Increased")
    else:
        print(tcs_FirstDC[i,0],"-->","Stock Price Decreased")
```

```
2002-08-12 00:00:00 --> Stock Price Increased
2002-08-13 00:00:00 --> Stock Price Decreased
2002-08-14 00:00:00 --> Stock Price Decreased
2002-08-15 00:00:00 --> Stock Price Decreased
2002-08-16 00:00:00 --> Stock Price Increased
2002-08-19 00:00:00 --> Stock Price Decreased
2002-08-20 00:00:00 --> Stock Price Increased
2002-08-21 00:00:00 --> Stock Price Decreased
2002-08-22 00:00:00 --> Stock Price Increased
2002-08-23 00:00:00 --> Stock Price Increased
2002-08-26 00:00:00 --> Stock Price Decreased
2002-08-27 00:00:00 --> Stock Price Decreased
2002-08-28 00:00:00 --> Stock Price Increased
2002-08-29 00:00:00 --> Stock Price Increased
2002-08-30 00:00:00 --> Stock Price Increased
2002-09-02 00:00:00 --> Stock Price Decreased
2002-09-03 00:00:00 --> Stock Price Decreased
2002-09-04 00:00:00 --> Stock Price Increased
2002-09-05 00:00:00 --> Stock Price Decreased
```

In [22]:
```
result=np.bitwise_and(np.int64(tcs_FirstDC[:,4:5]),2)
result
```

Out[22]:
```
array([[0],
       [0],
       [2],
       ...,
       [2],
       [2],
       [0]], dtype=int64)
```

In [23]:
```
tcs_SecondDC
```

Out[23]:
```
array([[Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
        28.70024426553483, 27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [24]:
```
result=np.vstack((tcs_FirstDC,tcs_SecondDC))
print(result.shape)
result
```

```
(4212, 5)
```

Out[24]:
```
array([[Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
        28.70024426553483, 27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [25]:
```
result=np.hstack((tcs_FirstDC,tcs_SecondDC))
print(result.shape)
result[0]
```

```
(2106, 10)
```

Out[25]:
```
array([Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
       28.70024426553483, 27.78542288474347, 28.48499298095703,
       Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
       28.70024426553483, 27.78542288474347, 28.48499298095703],
      dtype=object)
```

In [26]:
```
result=np.empty_like(tcs_FirstDC)
print(tcs_FirstDC.shape)
print(result.shape)
```

```
(2106, 5)
(2106, 5)
```

In [27]:
```
result
```

Out[27]:
```
array([[None, None, None, None, None],
       [None, None, None, None, None],
       [None, None, None, None, None],
       ...,
       [None, None, None, None, None],
       [None, None, None, None, None],
       [None, None, None, None, None]], dtype=object)
```

In [28]:
```
np.empty((4,4))
```

Out[28]:
```
array([[6.23042070e-307, 4.67296746e-307, 1.69121096e-306,
        1.86921415e-306],
       [8.34441742e-308, 1.78022342e-306, 6.23058028e-307,
        9.79107872e-307],
       [6.89807188e-307, 7.56594375e-307, 6.23060065e-307,
        1.78021527e-306],
       [8.34454050e-308, 1.11261027e-306, 1.15706896e-306,
        1.33512173e-306]])
```

In [29]:
```
array1=np.arange(1,17,2)
array1.reshape(4,2)
```

Out[29]:
```
array([[ 1,  3],
       [ 5,  7],
       [ 9, 11],
       [13, 15]])
```

In [30]:
```
print("std dev. of close price",np.std(tcs_FirstDC[:,4:5]))
```

```
std dev. of close price 96.21715236515651
```

In [31]:
```
print("Var dev. of close price",np.var(tcs_FirstDC[:,4:5]))
```

```
Var dev. of close price 9257.740409259743
```

In [32]:
```
print("Mean dev. of close price",np.mean(tcs_FirstDC[:,4:5]))
```

```
Mean dev. of close price 150.21374507824353
```

In [33]:
```
print("Median dev. of close price",np.median(tcs_FirstDC[:,4:5]))
```

```
Median dev. of close price 147.49518585205075
```

In [34]:
```
result=tcs_FirstDC.copy()
result
```

Out[34]:
```
array([[Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
        28.70024426553483, 27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [35]:
```
tcs_FirstDC[0][1]=88888
tcs_FirstDC
```

Out[35]:
```
array([[Timestamp('2002-08-12 00:00:00'), 88888, 28.70024426553483,
        27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [36]:
```
result
```

Out[36]:
```
array([[Timestamp('2002-08-12 00:00:00'), 27.78542288474347,
        28.70024426553483, 27.78542288474347, 28.48499298095703],
       [Timestamp('2002-08-13 00:00:00'), 28.52086875697312,
        28.9782794636968, 27.89305089125358, 28.09933280944824],
       [Timestamp('2002-08-14 00:00:00'), 28.16211253034757,
        28.16211253034757, 25.6329026031769, 26.16206550598145],
       ...,
       [Timestamp('2010-12-28 00:00:00'), 448.7846543420418,
        452.5992742187929, 448.33244741254, 450.8099365234375],
       [Timestamp('2010-12-29 00:00:00'), 451.8522033325688,
        456.9645433180547, 451.085371536744, 454.9785766601562],
       [Timestamp('2010-12-30 00:00:00'), 453.2285208868343,
        461.9981678682445, 453.2285208868343, 460.1891479492188]],
      dtype=object)
```

In [ ]: