In [3]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb
!pip install xgboost
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from xgboost import XGBClassifier
from sklearn import metrics

import warnings
warnings.filterwarnings('ignore')
```

```
Defaulting to user installation because normal site-packages is not writea
ble
Collecting xgboost
  Downloading xgboost-1.7.6-py3-none-win_amd64.whl (70.9 MB)
     ---------------------------------------- 70.9/70.9 MB 2.8 MB/s eta 0:
00:00
Requirement already satisfied: numpy in c:\programdata\anaconda3\lib\site-
packages (from xgboost) (1.21.5)
Requirement already satisfied: scipy in c:\programdata\anaconda3\lib\site-
packages (from xgboost) (1.9.1)
Installing collected packages: xgboost
Successfully installed xgboost-1.7.6
```

In [5]:

```
df = pd.read_csv('C:\\Users\\waghm\\OneDrive\\Desktop\\tesla.csv')
df.head()
```

Out[5]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	29-06-2010	19.000000	25.00	17.540001	23.889999	23.889999	18766300
1	30-06-2010	25.790001	30.42	23.299999	23.830000	23.830000	17187100
2	01-07-2010	25.000000	25.92	20.270000	21.959999	21.959999	8218800
3	02-07-2010	23.000000	23.10	18.709999	19.200001	19.200001	5139800
4	06-07-2010	20.000000	20.00	15.830000	16.110001	16.110001	6866900

In [9]:

```
df.shape
```

Out[9]:

```
(2416, 7)
```

In [12]:

```
df.describe()
```

Out[12]:

	Open	High	Low	Close	Adj Close	Volume
count	2416.000000	2416.000000	2416.000000	2416.000000	2416.000000	2.416000e+03
mean	186.271147	189.578224	182.916639	186.403651	186.403651	5.572722e+06
std	118.740163	120.892329	116.857591	119.136020	119.136020	4.987809e+06
min	16.139999	16.629999	14.980000	15.800000	15.800000	1.185000e+05
25%	34.342498	34.897501	33.587501	34.400002	34.400002	1.899275e+06
50%	213.035004	216.745002	208.870002	212.960007	212.960007	4.578400e+06
75%	266.450012	270.927513	262.102501	266.774994	266.774994	7.361150e+06
max	673.690002	786.140015	673.520020	780.000000	780.000000	4.706500e+07

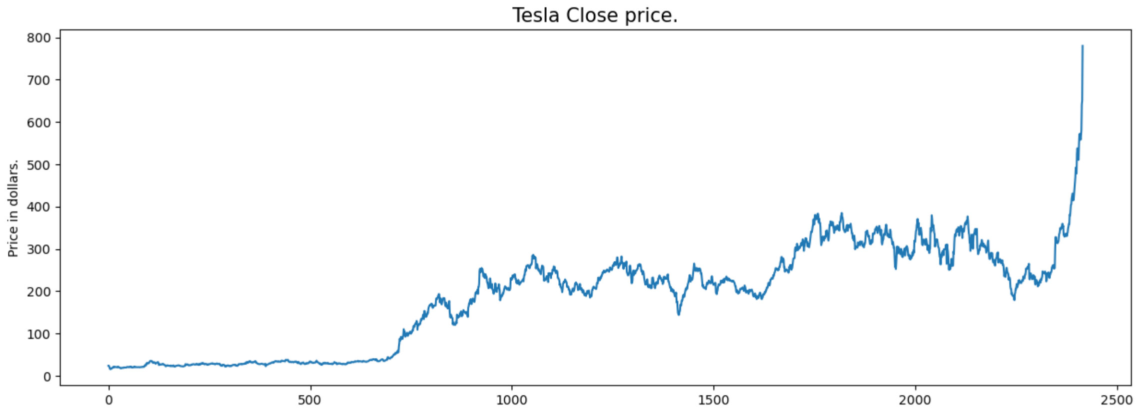
In [13]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2416 entries, 0 to 2415
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   Date       2416 non-null   object 
 1   Open       2416 non-null   float64
 2   High       2416 non-null   float64
 3   Low        2416 non-null   float64
 4   Close      2416 non-null   float64
 5   Adj Close  2416 non-null   float64
 6   Volume     2416 non-null   int64  
dtypes: float64(5), int64(1), object(1)
memory usage: 132.2+ KB
```

In [14]:

```
plt.figure(figsize=(15,5))
plt.plot(df['Close'])
plt.title('Tesla Close price.', fontsize=15)
plt.ylabel('Price in dollars.')
plt.show()
```



In [15]:

```
df[df['Close'] == df['Adj Close']].shape
```

Out[15]:

```
(2416, 7)
```

In [16]:

```
df = df.drop(['Adj Close'], axis=1)
```

In [17]:

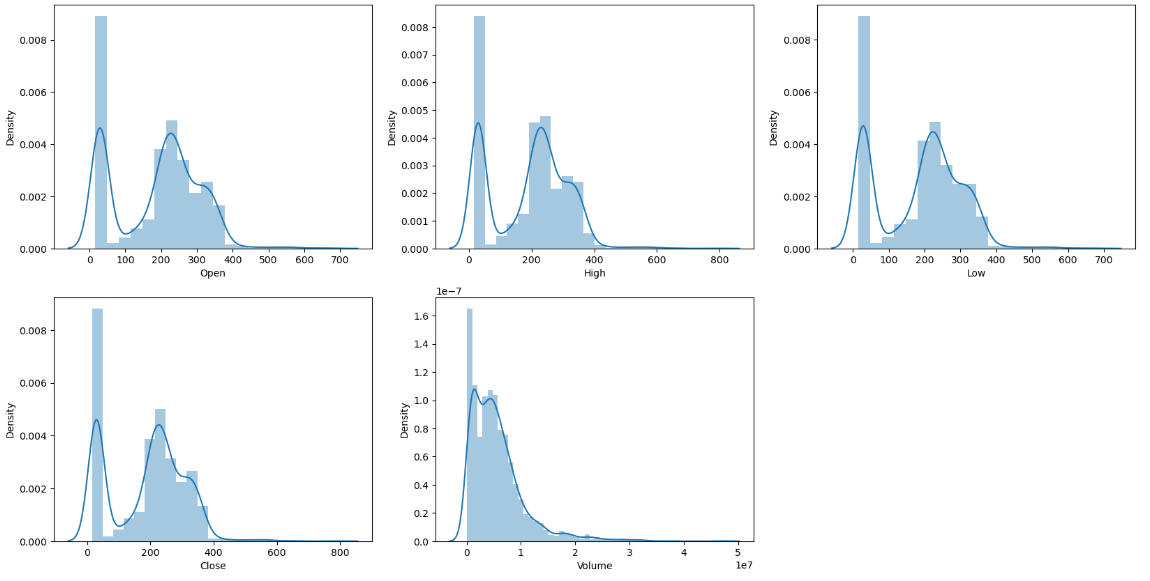
```
df.isnull().sum()
```

Out[17]:

```
Date      0
Open      0
High      0
Low       0
Close     0
Volume    0
dtype: int64
```

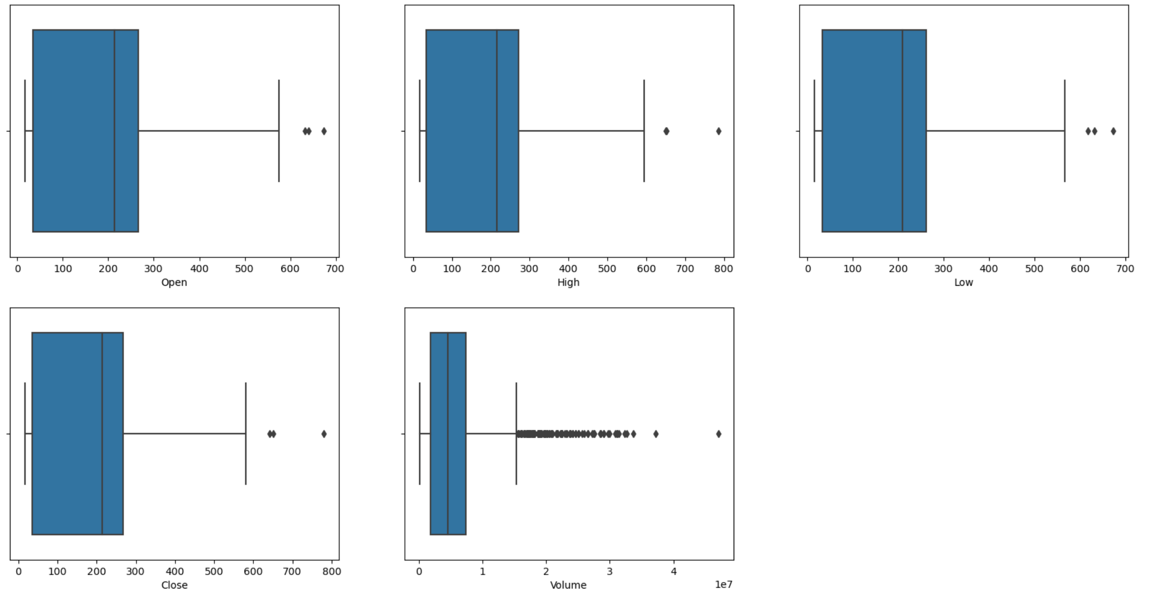
In [19]:

```
features = ['Open', 'High', 'Low', 'Close', 'Volume']

plt.subplots(figsize=(20,10))

for i, col in enumerate(features):
 plt.subplot(2,3,i+1)
 sb.distplot(df[col])
plt.show()
```



In [20]:

```
plt.subplots(figsize=(20,10))
for i, col in enumerate(features):
 plt.subplot(2,3,i+1)
 sb.boxplot(df[col])
plt.show()
```



In [25]:

```
df.head()
```

Out[25]:

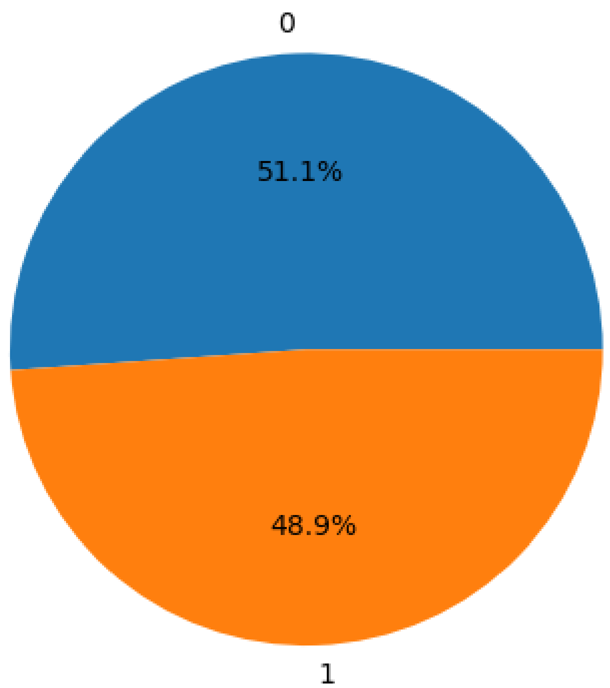
	Date	Open	High	Low	Close	Volume
0	29-06-2010	19.000000	25.00	17.540001	23.889999	18766300
1	30-06-2010	25.790001	30.42	23.299999	23.830000	17187100
2	01-07-2010	25.000000	25.92	20.270000	21.959999	8218800
3	02-07-2010	23.000000	23.10	18.709999	19.200001	5139800
4	06-07-2010	20.000000	20.00	15.830000	16.110001	6866900

In [31]:

```
df['open-close'] = df['Open'] - df['Close']
df['low-high'] = df['Low'] - df['High']
df['target'] = np.where(df['Close'].shift(-1) > df['Close'], 1, 0)
```

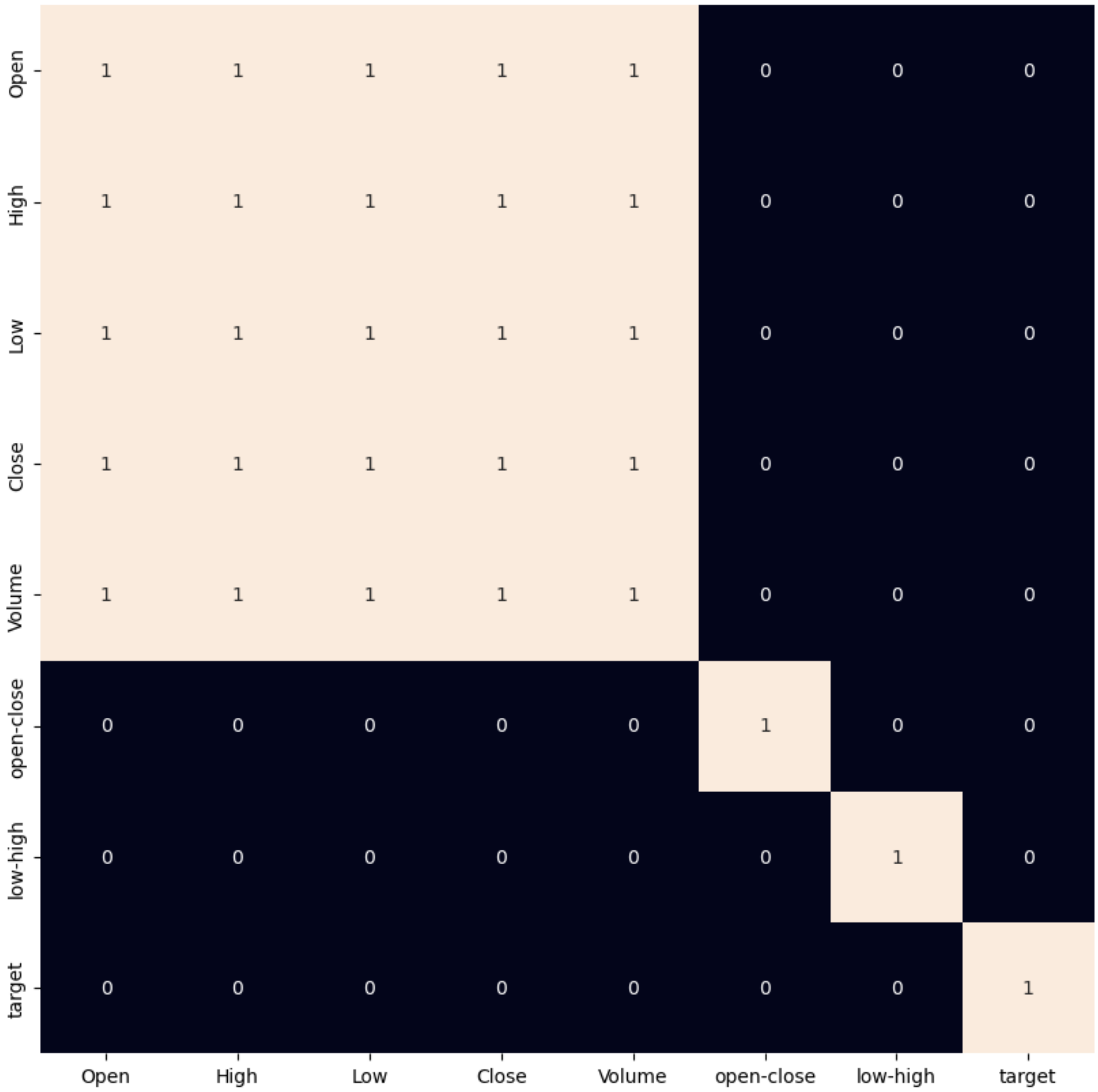
In [32]:

```
plt.pie(df['target'].value_counts().values,
        labels=[0, 1], autopct='%1.1f%%')
plt.show()
```



In [43]:

```
plt.figure(figsize=(10, 10))

# As our concern is with the highly
# correlated features only so, we will visualize
# our heatmap as per that criteria only.
sb.heatmap(df.corr() > 0.2, annot=True, cbar=False)
plt.show()
```



In [35]:

```
features = df[['open-close', 'low-high']]
target = df['target']

scaler = StandardScaler()
features = scaler.fit_transform(features)

X_train, X_valid, Y_train, Y_valid = train_test_split(
    features, target, test_size=0.1, random_state=2022)
print(X_train.shape, X_valid.shape)
```

```
(2174, 2) (242, 2)
```

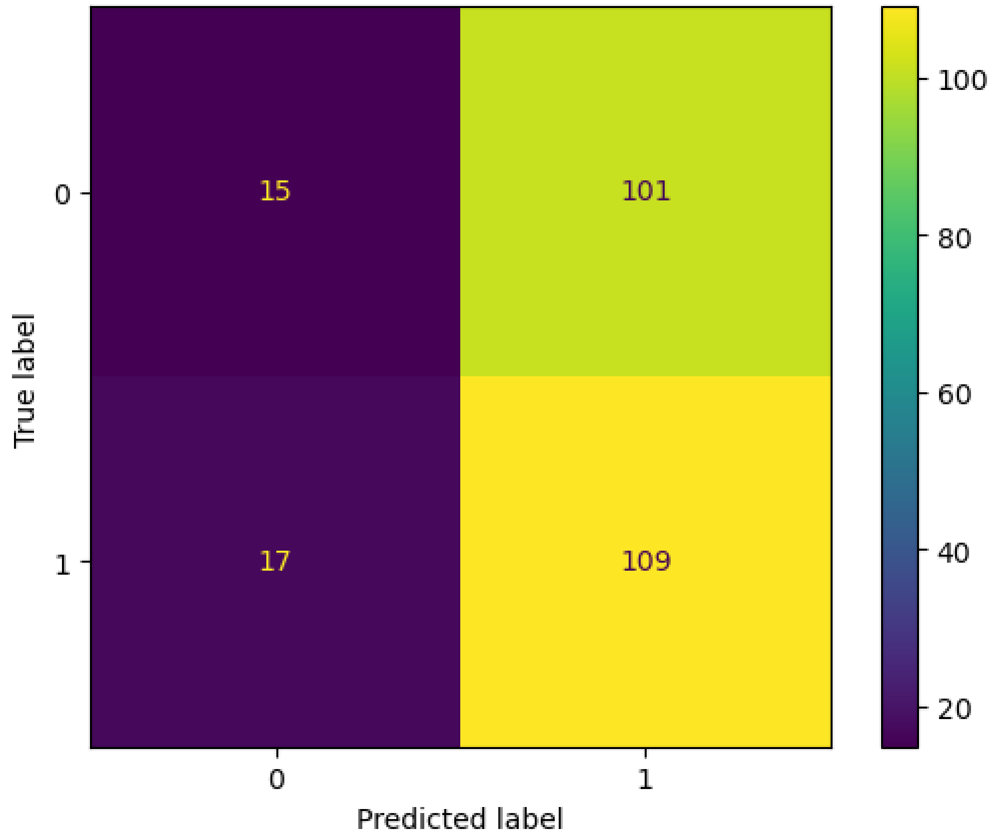
In [37]:

```
models = [LogisticRegression(), SVC(
kernel='poly', probability=True), XGBClassifier()]

for i in range(3):
 models[i].fit(X_train, Y_train)

print(f'{models[i]} : ')
print('Training Accuracy : ', metrics.roc_auc_score(
    Y_train, models[i].predict_proba(X_train)[:,1]))
print('Validation Accuracy : ', metrics.roc_auc_score(
    Y_valid, models[i].predict_proba(X_valid)[:,1]))
print()
```

```
XGBClassifier(base_score=None, booster=None, callbacks=None,
              colsample_bylevel=None, colsample_bynode=None,
              colsample_bytree=None, early_stopping_rounds=None,
              enable_categorical=False, eval_metric=None, feature_types=No
ne,
              gamma=None, gpu_id=None, grow_policy=None, importance_type=N
one,
              interaction_constraints=None, learning_rate=None, max_bin=No
ne,
              max_cat_threshold=None, max_cat_to_onehot=None,
              max_delta_step=None, max_depth=None, max_leaves=None,
              min_child_weight=None, missing=nan, monotone_constraints=Non
e,
              n_estimators=100, n_jobs=None, num_parallel_tree=None,
              predictor=None, random_state=None, ...) :
Training Accuracy :  0.9581317178695861
Validation Accuracy :  0.4304871373836891
```

In [38]:

```
metrics.plot_confusion_matrix(models[0], X_valid, Y_valid)
plt.show()
```



In [ ]:

```
```