In [1]:
```
import pandas as pd
df=pd.read_csv('Iris.csv')
print(df)
```

Out[1]:
```
      Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm  \
0      1            5.1           3.5            1.4           0.2
1      2            4.9           3.0            1.4           0.2
2      3            4.7           3.2            1.3           0.2
3      4            4.6           3.1            1.5           0.2
4      5            5.0           3.6            1.4           0.2
..   ...            ...           ...            ...           ...
145  146            6.7           3.0            5.2           2.3
146  147            6.3           2.5            5.0           1.9
147  148            6.5           3.0            5.2           2.0
148  149            6.2           3.4            5.4           2.3
149  150            5.9           3.0            5.1           1.8

            Species
0       Iris-setosa
1       Iris-setosa
2       Iris-setosa
3       Iris-setosa
4       Iris-setosa
..              ...
145  Iris-virginica
146  Iris-virginica
147  Iris-virginica
148  Iris-virginica
149  Iris-virginica

[150 rows x 6 columns]
```

In [4]:
```
print(d.shape)
```

Out[4]:
```
(150, 6)
```

In [5]:
```
print(d.describe())
```

Out[5]:
```
               Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
count  150.000000     150.000000    150.000000     150.000000    150.000000
mean    75.500000       5.843333      3.054000       3.758667      1.198667
std     43.445368       0.828066      0.433594       1.764420      0.763161
min      1.000000       4.300000      2.000000       1.000000      0.100000
25%     38.250000       5.100000      2.800000       1.600000      0.300000
50%     75.500000       5.800000      3.000000       4.350000      1.300000
75%    112.750000       6.400000      3.300000       5.100000      1.800000
max    150.000000       7.900000      4.400000       6.900000      2.500000
```

In [6]:
```
print(d.isna().sum())
print(d.describe())

Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

Out[6]:
```
               Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
count  150.000000     150.000000    150.000000     150.000000    150.000000
mean    75.500000       5.843333      3.054000       3.758667      1.198667
std     43.445368       0.828066      0.433594       1.764420      0.763161
min      1.000000       4.300000      2.000000       1.000000      0.100000
25%     38.250000       5.100000      2.800000       1.600000      0.300000
50%     75.500000       5.800000      3.000000       4.350000      1.300000
75%    112.750000       6.400000      3.300000       5.100000      1.800000
max    150.000000       7.900000      4.400000       6.900000      2.500000
```

In [7]:
```
d.head(150)
```

Out[7]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...	...
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 6 columns

In [8]:
```
a = len(d['Species'] == 'versicolor'])
print("No of Versicolor in Dataset:",a)
```

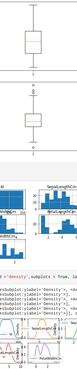
Out[8]:
```
No of Versicolor in Dataset: 0
```

In [9]:
```
n1 = len(d['Species'] == 'virginica'])
print("No of Virginica in Dataset:",n1)
```

Out[9]:
```
No of Virginica in Dataset: 0
```

In [13]:
```
import matplotlib.pyplot as plt
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
ax.axis('equal')
l = ['Versicolor', 'Setosa', 'Virginica']
s = [50,50,50]
ax.pie(s, labels = l,autopct='%1.2f%%')
plt.show()
```

Out[13]:

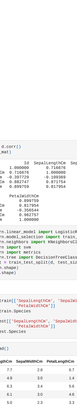


In [16]:
```
import matplotlib.pyplot as plt
plt.figure(1)
plt.boxplot(d['SepalLengthCm'])
plt.figure(2)
plt.boxplot(d['SepalWidthCm'])
plt.show()
```

Out[16]:

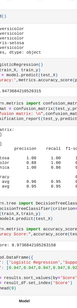
In [17]:
```
d.hist()
plt.show()
```

Out[17]:



In [18]:
```
d.plot(kind ='density',subplots = True, layout =(3,3),sharex = False)
```

Out[18]:
```
array([[<AxesSubplot:ylabel='Density'>, <AxesSubplot:ylabel='Density'>,
        <AxesSubplot:ylabel='Density'>],
       [<AxesSubplot:ylabel='Density'>, <AxesSubplot:ylabel='Density'>,
        <AxesSubplot:ylabel='Density'>],
       [<AxesSubplot:ylabel='Density'>, <AxesSubplot:ylabel='Density'>,
        <AxesSubplot:ylabel='Density'>]], dtype=object)
```



In [19]:
```
d.plot(kind ='box',subplots = True, layout =(2,5),sharex = False)
```

Out[19]:
```
Id                AxesSubplot(0.125,0.536818;0.133621x0.343182)
SepalLengthCm    AxesSubplot(0.285345,0.536818;0.133621x0.343182)
SepalWidthCm     AxesSubplot(0.44569,0.536818;0.133621x0.343182)
PetalLengthCm    AxesSubplot(0.606034,0.536818;0.133621x0.343182)
PetalWidthCm     AxesSubplot(0.766379,0.536818;0.133621x0.343182)
dtype: object
```

In [21]:
```
X = d['SepalLengthCm'].values.reshape(-1,1)
print(X)
```

Out[21]:
```
[[5.1]
 [4.9]
 [4.7]
 [4.6]
 [5. ]
 [5.4]
 [4.6]
 [5. ]
 [4.4]
 [4.9]
 [5.4]
 [4.8]
 [4.8]
 [4.3]
 [5.8]
 [5.7]
 [5.4]
 [5.1]
 [5.7]
 [5.1]
 [5.4]
 [5.1]
 [4.6]
 [5.1]
 [4.8]
 [5. ]
 [5. ]
 [5.2]
 [5.2]
 [4.7]
 [4.8]
 [5.4]
 [5.2]
 [5.5]
 [4.9]
 [5. ]
 [5.5]
 [4.9]
 [4.4]
 [5.1]
 [5. ]
 [4.5]
 [4.4]
 [5. ]
 [5.1]
 [4.8]
 [5.1]
 [4.6]
 [5.3]
 [5. ]
 [7. ]
 [6.4]
 [6.9]
 [5.5]
 [6.5]
 [5.7]
 [6.3]
 [4.9]
 [6.6]
 [5.2]
 [5. ]
 [5.9]
 [6. ]
 [6.1]
 [5.6]
 [6.7]
 [5.6]
 [5.8]
 [6.2]
 [5.6]
 [5.9]
 [6.1]
 [6.3]
 [6.1]
 [6.4]
 [6.6]
 [6.8]
 [6.7]
 [6. ]
 [5.7]
 [5.5]
 [5.5]
 [5.8]
 [6. ]
 [5.4]
 [6. ]
 [6.7]
 [6.3]
 [5.6]
 [5.5]
 [5.5]
 [6.1]
 [5.8]
 [5. ]
 [5.6]
 [5.7]
 [5.7]
 [6.2]
 [5.1]
 [5.7]
 [6.3]
 [5.8]
 [7.1]
 [6.3]
 [6.5]
 [7.6]
 [4.9]
 [7.3]
 [6.7]
 [7.2]
 [6.5]
 [6.4]
 [6.8]
 [5.7]
 [5.8]
 [6.4]
 [6.5]
 [7.7]
 [7.7]
 [6. ]
 [6.9]
 [5.6]
 [7.7]
 [6.3]
 [6.7]
 [7.2]
 [6.2]
 [6.1]
 [6.4]
 [7.2]
 [7.4]
 [7.9]
 [6.4]
 [6.3]
 [6.1]
 [7.7]
 [6.3]
 [6.4]
 [6.9]
 [6.7]
 [6.7]
 [6.3]
 [6.5]
 [6.2]
 [5.9]]
```

In [24]:
```
corr_mat = d.corr()
print(corr_mat)
```

Out[24]:
```
                     Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  \
Id             1.000000       0.716676     -0.397729       0.882747
SepalLengthCm  0.716676       1.000000     -0.109369       0.871754
SepalWidthCm  -0.397729      -0.109369      1.000000      -0.420516
PetalLengthCm  0.882747       0.871754     -0.420516       1.000000
PetalWidthCm   0.899759       0.817954     -0.356544       0.962757

               PetalWidthCm
Id                 0.899759
SepalLengthCm      0.817954
SepalWidthCm      -0.356544
PetalLengthCm      0.962757
PetalWidthCm       1.000000
```

In [27]:
```
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn import svm
from sklearn import metrics
from sklearn.tree import DecisionTreeClassifier
train, test = train_test_split(d, test_size = 0.25)
print(train.shape)
print(test.shape)
```

Out[27]:
```
(112, 6)
(38, 6)
```

In [28]:
```
train_X = train[['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm',
                 'PetalWidthCm']]
train_y = train.Species

test_X = test[['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm',
               'PetalWidthCm']]
test_y = test.Species
```

In [30]:
```
train_X.head()
```

Out[30]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
122	7.7	2.8	6.7	2.0
1	4.9	3.0	1.4	0.2
136	6.3	3.4	5.6	2.4
91	6.1	3.0	4.6	1.4
93	5.0	2.3	3.3	1.0

In [31]:
```
test_y.head()
```

Out[31]:
```
61     Iris-versicolor
78     Iris-versicolor
95     Iris-versicolor
16     Iris-setosa
50     Iris-versicolor
Name: Species, dtype: object
```

In [32]:
```
model = LogisticRegression()
model.fit(train_X, train_y)
prediction = model.predict(test_X)
print('Accuracy:',metrics.accuracy_score(prediction,test_y))

Accuracy: 0.8473684210526315
```

In [33]:
```
from sklearn.metrics import confusion_matrix,classification_report
confusion_mat = confusion_matrix(test_y,prediction)
print("Confusion matrix:\n",confusion_mat)
print(classification_report(test_y,prediction))

Confusion matrix:
 [[ 9  0  0]
 [ 0 15  3]
 [ 0  2 11]]
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00         9
Iris-versicolor       0.88      1.00      0.94        15
 Iris-virginica       1.00      0.86      0.92        14

       accuracy                           0.95        38
      macro avg       0.96      0.95      0.95        38
   weighted avg       0.95      0.95      0.95        38
```

In [34]:
```
from sklearn.tree import DecisionTreeClassifier
model = DecisionTreeClassifier(criterion='entropy',random_state=7)
model.fit(train_X,train_y)
y_pred = model.predict(test_X)

from sklearn.metrics import accuracy_score
print("Accuracy Score",accuracy_score(test_y,y_pred))

Accuracy Score: 0.9736842105263158
```

In [35]:
```
results = pd.DataFrame({
    'Model': ['Logistic Regression', 'Support Vector Machines', 'Naive Bayes','KNN' , 'Decision Tree'],
    'Score': [0.947,0.967,0.947,0.947,0.921]})

result_df = results.sort_values(by='Score', ascending=False)
result_df = result_df.set_index('Score')
result_df.head(5)
```

Out[35]:

Score	Model
0.967	Logistic Regression
0.947	Support Vector Machines
0.947	Naive Bayes
0.947	KNN
0.921	Decision Tree

In [ ]:
```

```