Import libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
from sklearn.datasets import load_iris
%matplotlib inline
```

```
df = pd.read_csv("loan_data_set.csv")
```

```
df.head()
```

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term
0	LP001002	Male	No	0	Graduate	No	5849	0.0	NaN	360.0
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0	128.0	360.0
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0	66.0	360.0
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0	120.0	360.0
4	LP001008	Male	No	0	Graduate	No	6000	0.0	141.0	360.0

Basic stats

```
df.shape
```

```
(614, 13)
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 614 entries, 0 to 613
Data columns (total 13 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   Loan_ID            614 non-null    object 
 1   Gender             601 non-null    object 
 2   Married            611 non-null    object 
 3   Dependents         599 non-null    object 
 4   Education          614 non-null    object 
 5   Self_Employed      582 non-null    object 
 6   ApplicantIncome    614 non-null    int64  
 7   CoapplicantIncome  614 non-null    float64
 8   LoanAmount         592 non-null    float64
 9   Loan_Amount_Term   600 non-null    float64
 10  Credit_History     564 non-null    float64
 11  Property_Area      614 non-null    object 
 12  Loan_Status        614 non-null    object 
dtypes: float64(4), int64(1), object(8)
memory usage: 62.5+ KB
```

```
df.describe()
```

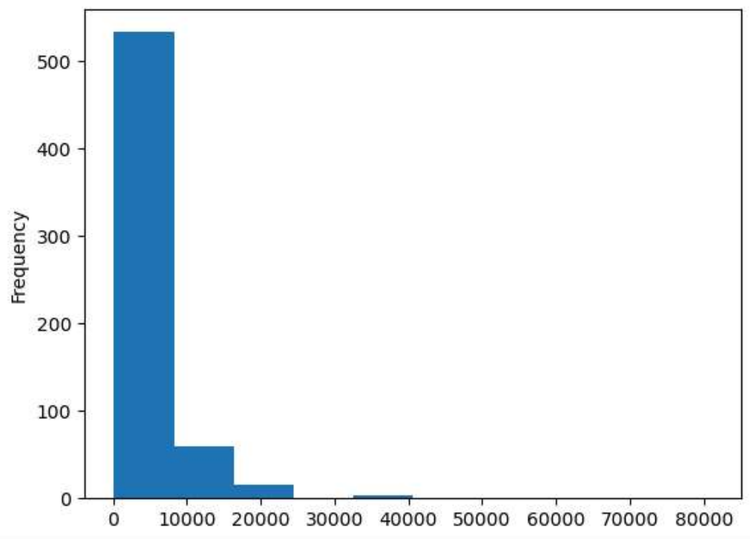
	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History
count	614.000000	614.000000	592.000000	600.00000	564.000000
mean	5403.459283	1621.245798	146.412162	342.00000	0.842199
std	6109.041673	2926.248369	85.587325	65.12041	0.364878
min	150.000000	0.000000	9.000000	12.00000	0.000000
25%	2877.500000	0.000000	100.000000	360.00000	1.000000
50%	3812.500000	1188.500000	128.000000	360.00000	1.000000
75%	5795.000000	2297.250000	168.000000	360.00000	1.000000
max	81000.000000	41667.000000	700.000000	480.00000	1.000000

```
df.isna().sum()
```

```
Loan_ID              0
Gender              13
Married              3
Dependents          15
Education            0
Self_Employed       32
ApplicantIncome      0
CoapplicantIncome    0
LoanAmount          22
Loan_Amount_Term    14
Credit_History      50
Property_Area        0
Loan_Status          0
dtype: int64
```

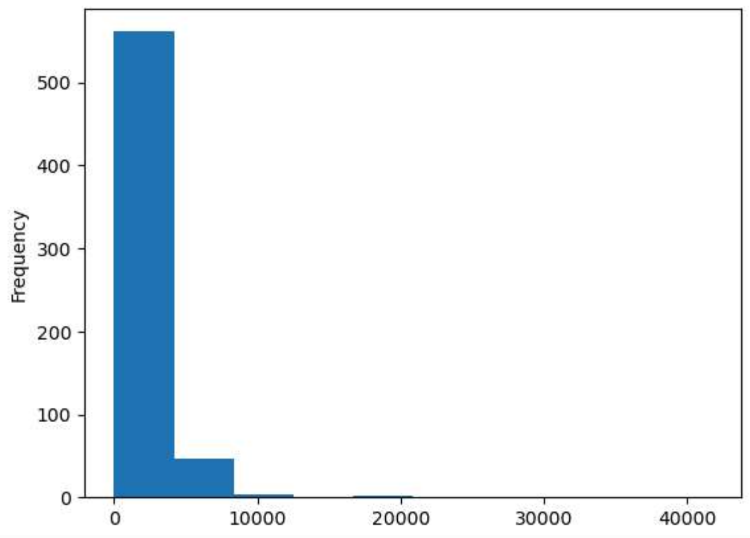
Let us group the quantitative variables 'ApplicantIncome', 'Coapplicant Income', 'LoanAmount', 'Loan_Amount_Term', 'Credit_History' by 'Loan_Status' categorical variable

```
df["ApplicantIncome"].plot(kind="hist")
plt.show()
```



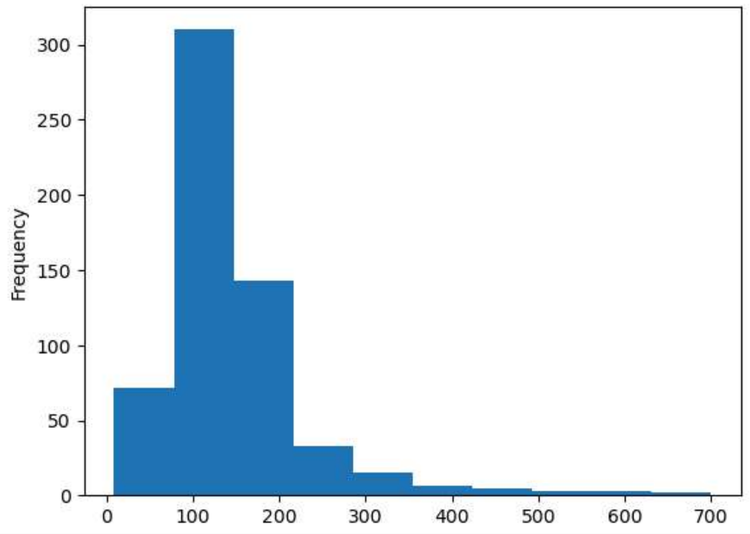
```
df["ApplicantIncome"].fillna(df["ApplicantIncome"].mean(), inplace=True)
```

```
df["CoapplicantIncome"].plot(kind="hist")
plt.show()
```



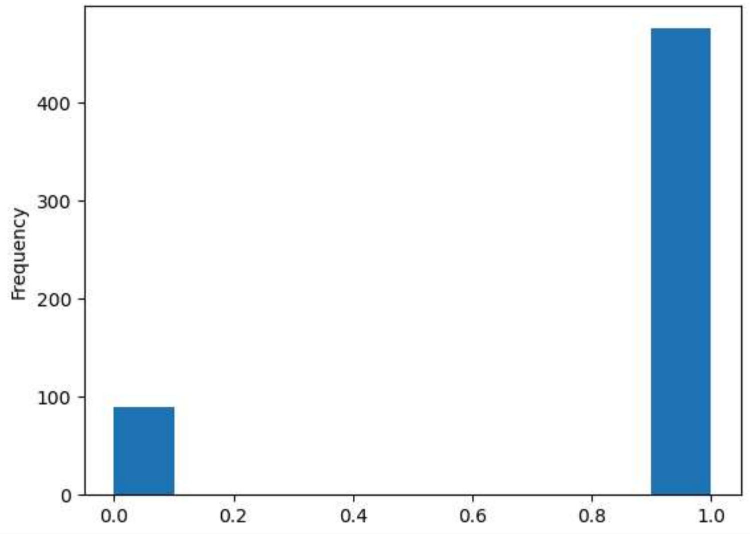
```
df["CoapplicantIncome"].fillna(df["CoapplicantIncome"].mean(), inplace=True)
```

```
df["LoanAmount"].plot(kind="hist")
plt.show()
```



```
df["LoanAmount"].fillna(df["LoanAmount"].mean(), inplace=True)
```

```
df["Credit_History"].plot(kind="hist")
plt.show()
```



```
df["Credit_History"].fillna(np.random.randint(0,2), inplace=True)
```

```
grouped_df = df[["ApplicantIncome", "CoapplicantIncome", "LoanAmount", "Credit_History"]].groupby(df["Loan_Status"])
```

Stats of the grouped data

```
mean = grouped_df.mean()
mean
```

Loan_Status	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History
N	5446.078125	1877.807292	150.945488	0.572917
Y	5384.068720	1504.516398	144.349606	0.983412

```
median = grouped_df.median()
median
```

Loan_Status	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History
N	3833.5	268.0	133.5	1.0
Y	3812.5	1239.5	128.0	1.0

```
min = grouped_df.min()
min
```

Loan_Status	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History
N	150	0.0	9.0	0.0
Y	210	0.0	17.0	0.0

```
max = grouped_df.max()
max
```

Loan_Status	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History
N	81000	41667.0	570.0	1.0
Y	63337	20000.0	700.0	1.0

```
std = grouped_df.std()
std
```

Loan_Status	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History
N	6819.558528	4384.060103	83.361163	0.495948
Y	5765.441615	1924.754855	84.361109	0.127872

Iris dataset

```
iris = load_iris()
iris.keys()
```

```
dict_keys(['data', 'target', 'frame', 'target_names', 'DESCR', 'feature_names', 'filename', 'data_module'])
```

```
iris_df = pd.DataFrame(iris.data, columns = iris.feature_names)
iris_df["label"] = iris.target
```

```
iris.target_names
```

```
array(['setosa', 'versicolor', 'virginica'], dtype='<U10')
```

0 -> setosa
1 -> versicolor
2 -> virginica

```
iris_df.shape
```

```
(150, 5)
```

```
iris_df.head()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	label
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0

Basic stats

```
iris_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   sepal length (cm)  150 non-null    float64
 1   sepal width (cm)   150 non-null    float64
 2   petal length (cm)  150 non-null    float64
 3   petal width (cm)   150 non-null    float64
 4   label              150 non-null    int32  
dtypes: float64(4), int32(1)
memory usage: 5.4 KB
```

```
iris_df.describe()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	label
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.057333	3.758000	1.199333	1.000000
std	0.828066	0.435866	1.765298	0.762238	0.819232
min	4.300000	2.000000	1.000000	0.100000	0.000000
25%	5.100000	2.800000	1.600000	0.300000	0.000000
50%	5.800000	3.000000	4.350000	1.300000	1.000000
75%	6.400000	3.300000	5.100000	1.800000	2.000000
max	7.900000	4.400000	6.900000	2.500000	2.000000

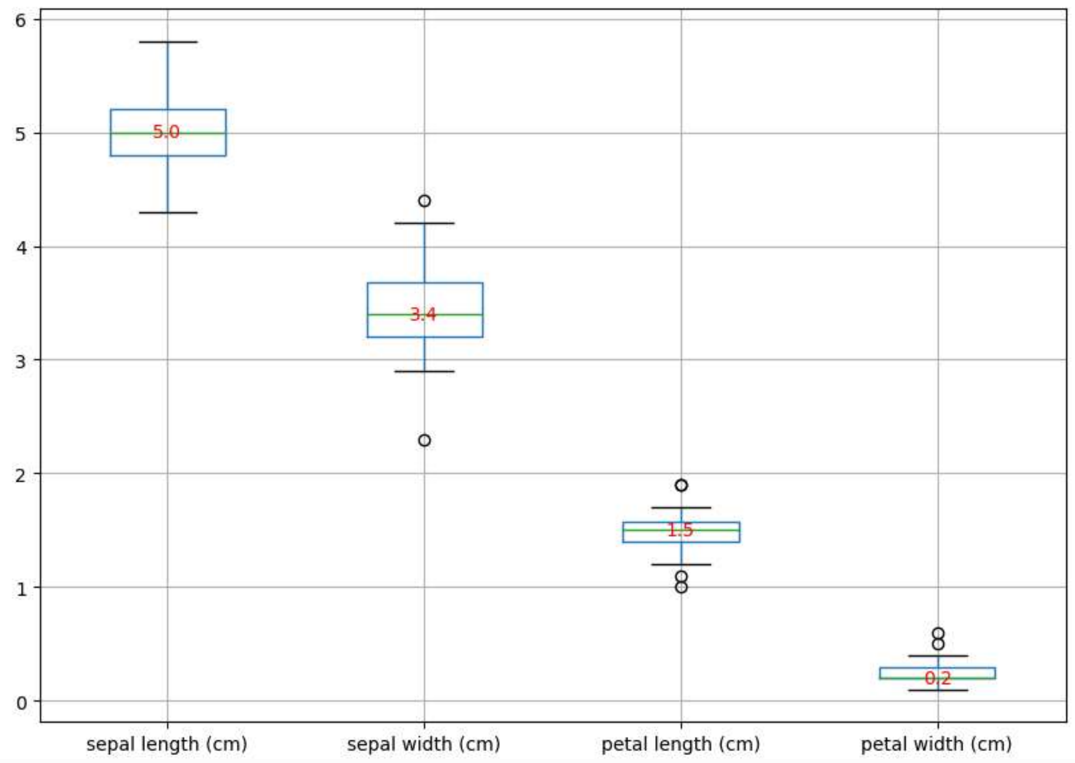
Setosa stats

```
setosa = iris_df[iris_df["label"] == 0].drop("label", axis=1)
```

```
setosa.describe()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
count	50.00000	50.000000	50.000000	50.000000
mean	5.00600	3.428000	1.462000	0.246000
std	0.35249	0.379064	0.173664	0.105386
min	4.30000	2.300000	1.000000	0.100000
25%	4.80000	3.200000	1.400000	0.200000
50%	5.00000	3.400000	1.500000	0.200000
75%	5.20000	3.675000	1.575000	0.300000
max	5.80000	4.400000	1.900000	0.600000

```
plt.figure(figsize=(10,7))
box = setosa.boxplot()
medians = setosa.median()
for i in range(len(medians)):
    box.annotate(medians[i], (i+1, medians[i]), ha="center", va="center", color="red", size=10)
plt.show()
```



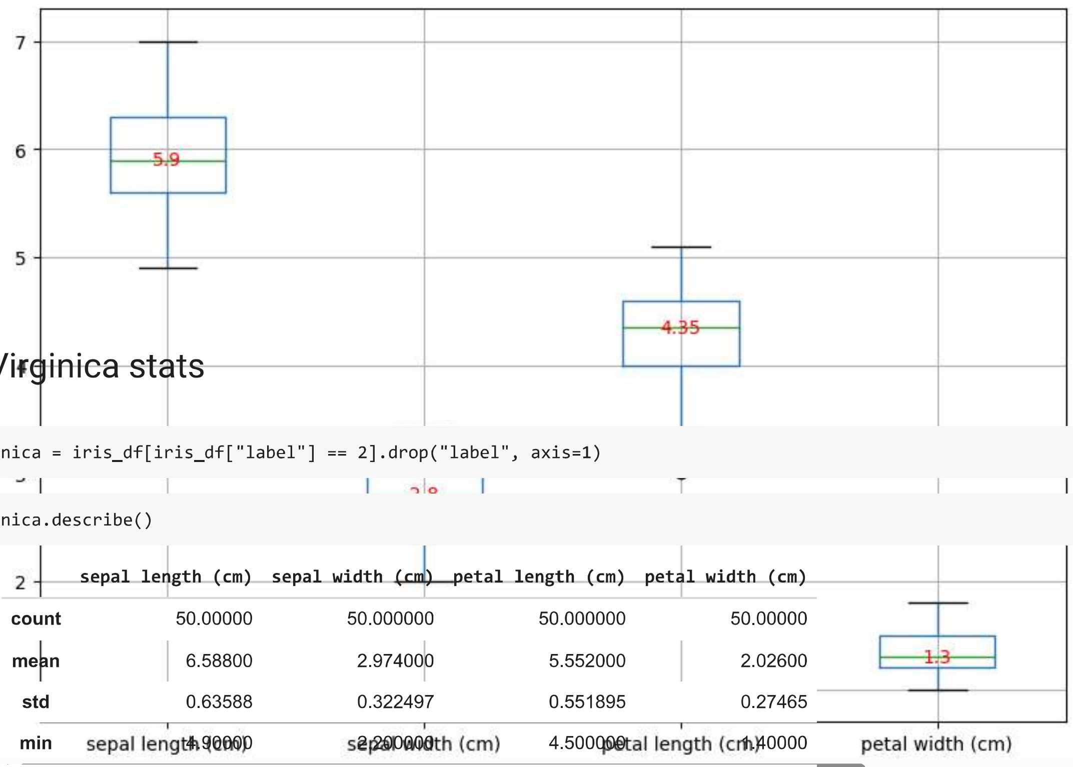
Versicolor stats

```
versicolor = iris_df[iris_df["label"] == 1].drop("label", axis=1)
```

```
versicolor.describe()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
count	50.000000	50.000000	50.000000	50.000000
mean	5.936000	2.770000	4.260000	1.326000
std	0.516171	0.313798	0.469911	0.197753
min	4.900000	2.000000	3.000000	1.000000
25%	5.600000	2.525000	4.000000	1.200000
50%	5.900000	2.800000	4.350000	1.300000
75%	6.300000	3.000000	4.600000	1.500000
max	7.000000	3.400000	5.100000	1.800000

```
plt.figure(figsize=(10,7))
box = versicolor.boxplot()
medians = versicolor.median()
for i in range(len(medians)):
    box.annotate(medians[i], (i+1, medians[i]), ha="center", va="center", color="red", size=10)
plt.show()
```



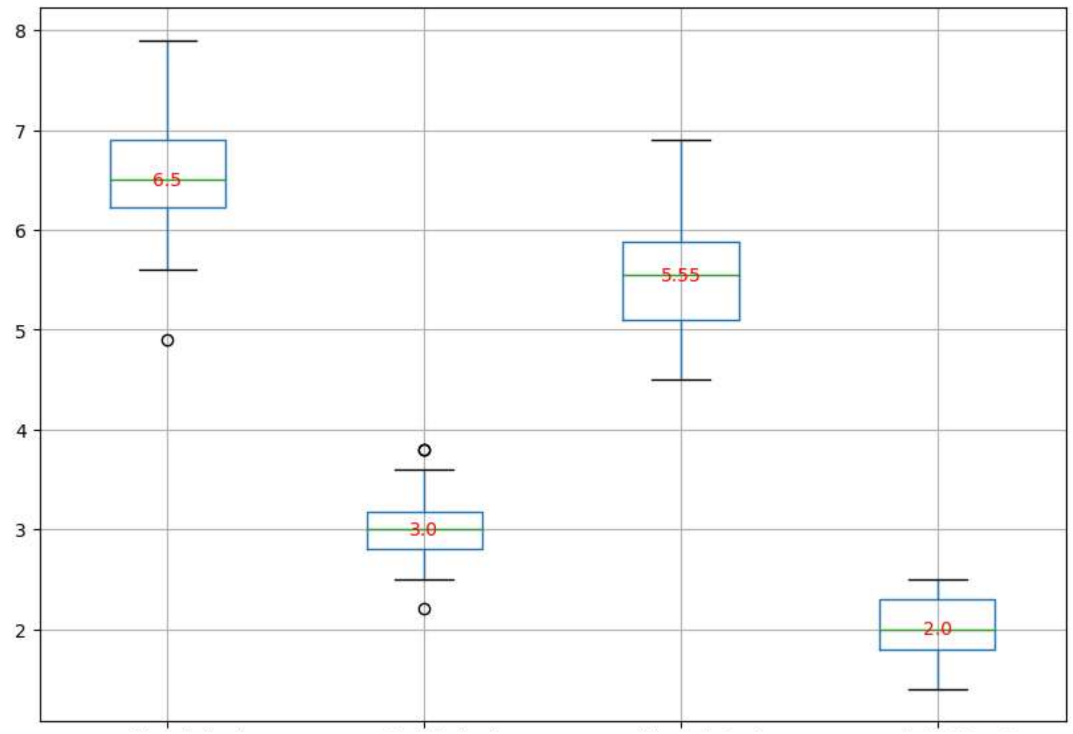
Virginica stats

```
virginica = iris_df[iris_df["label"] == 2].drop("label", axis=1)
```

```
virginica.describe()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
count	50.00000	50.000000	50.000000	50.00000
mean	6.58800	2.974000	5.552000	2.02600
std	0.63588	0.322497	0.551895	0.27465
min	4.90000	2.200000	4.500000	1.40000
25%	6.22500	2.800000	5.100000	1.80000
50%	6.50000	3.000000	5.550000	2.00000
75%	6.90000	3.175000	5.875000	2.30000
max	7.90000	3.800000	6.900000	2.50000

```
plt.figure(figsize=(10,7))
box = virginica.boxplot()
medians = virginica.median()
for i in range(len(medians)):
    box.annotate(medians[i], (i+1, medians[i]), ha="center", va="center", color="red", size=10)
plt.show()
```


8
7
6
5
4
3
2
6.5
3.0
5.55
2.0