```
# Goals of EDA:
1. Data cleaning
2. Descriptive Stat.
3. Data Visualization
4. Feature engineering
5. Correlation and relationship
6. Data segmentation
7. Hypothesis
8. Data quality

# types of EDA:
1. Univarite Analysis
2. Bivarite Analysis
3. Multivarite analysis
4. Time series
5. Missing data analysis
6. Outlier Analysis
7. Data Vis.


# import package
import pandas as pd

#load my data
df = pd.read_csv('/content/employees.csv')

df.head() # for printing first 5 rows
```

	First Name	Gender	Start Date	Last Login Time	Salary	Bonus %	Senior Management	Team
0	Douglas	Male	8/6/1993	12:42 PM	97308	6.945	True	Marketing
1	Thomas	Male	3/31/1996	6:53 AM	61933	4.170	True	NaN
2	Maria	Female	4/23/1993	11:17 AM	130590	11.858	False	Finance

Task 1 - insight about the data !!

```
df.shape

#we findout the rows / columns
```

```
(1000, 8)
```

```
# DS
df.describe()
```

	Salary	Bonus %
count	1000.000000	1000.000000
mean	90662.181000	10.207555
std	32923.693342	5.528481
min	35013.000000	1.015000
25%	62613.000000	5.401750
50%	90428.000000	9.838500
75%	118740.250000	14.838000
max	149908.000000	19.944000

```
df.describe(include='object')
```

	First Name	Gender	Start Date	Last Login Time	Senior Management	Team
count	933	855	1000	1000	933	957
unique	200	2	972	720	2	10
top	Marilyn	Female	10/30/1994	1:35 PM	True	Client Services

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 8 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   First Name         933 non-null    object 
 1   Gender             855 non-null    object 
 2   Start Date         1000 non-null   object 
 3   Last Login Time    1000 non-null   object 
 4   Salary             1000 non-null   int64  
 5   Bonus %            1000 non-null   float64
 6   Senior Management  933 non-null    object 
 7   Team               957 non-null    object 
dtypes: float64(1), int64(1), object(6)
memory usage: 62.6+ KB
```

Task 2 - Dtype converstion (object to datetime)

```
df['Start Date'] = pd.to_datetime(df['Start Date'])
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 8 columns):
 #   Column             Non-Null Count  Dtype         
---  ------             --------------  -----         
 0   First Name         933 non-null    object        
 1   Gender             855 non-null    object        
 2   Start Date         1000 non-null   datetime64[ns]
 3   Last Login Time    1000 non-null   object        
 4   Salary             1000 non-null   int64         
 5   Bonus %            1000 non-null   float64       
 6   Senior Management  933 non-null    object        
 7   Team               957 non-null    object        
dtypes: datetime64[ns](1), float64(1), int64(1), object(5)
memory usage: 62.6+ KB
```

```
# uniques
```

```
df.nunique()
```

```
First Name           200
Gender                 2
Start Date           972
Last Login Time      720
Salary               995
Bonus %              971
Senior Management      2
Team                  10
dtype: int64
```

Task 3 - Missing Values Handling

1. detect the missing
2. drop
3. fill
4. replace

---

python function handling missing values:

1. isnull()
2. notnull()
3. dropna()
4. fillna()
5. replace()

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

```
First Name           67
Gender              145
Start Date            0
Last Login Time       0
Salary                0
Bonus %               0
Senior Management    67
```

```
Team                 43
dtype: int64
```

```
#Gender

df['Gender'].fillna("No Gender", inplace=True)
df.isnull().sum()
```

```
First Name           67
Gender                0
Start Date            0
Last Login Time       0
Salary                0
Bonus %               0
Senior Management    67
Team                 43
dtype: int64
```

```
import numpy as np

mode = df['Senior Management'].mode().values[0]

df['Senior Management'] = df['Senior Management'].replace(np.nan, mode)

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

```
First Name           67
Gender                0
Start Date            0
Last Login Time       0
Salary                0
Bonus %               0
Senior Management     0
Team                 43
dtype: int64
```

```
df = df.dropna(axis=0, how='any')

print(df.isnull().sum())
df.shape
```

```
First Name           0
Gender               0
Start Date           0
Last Login Time      0
Salary               0
Bonus %              0
Senior Management    0
Team                 0
dtype: int64
(899, 8)
```

Task 4 - Data Encoding

```
from sklearn.preprocessing import LabelEncoder

le = LabelEncoder()

df['Gender'] = le.fit_transform(df['Gender'])
```

```
df['Gender'].unique()
```

```
array([1, 0, 2])
```

Task 5 - Data visualization

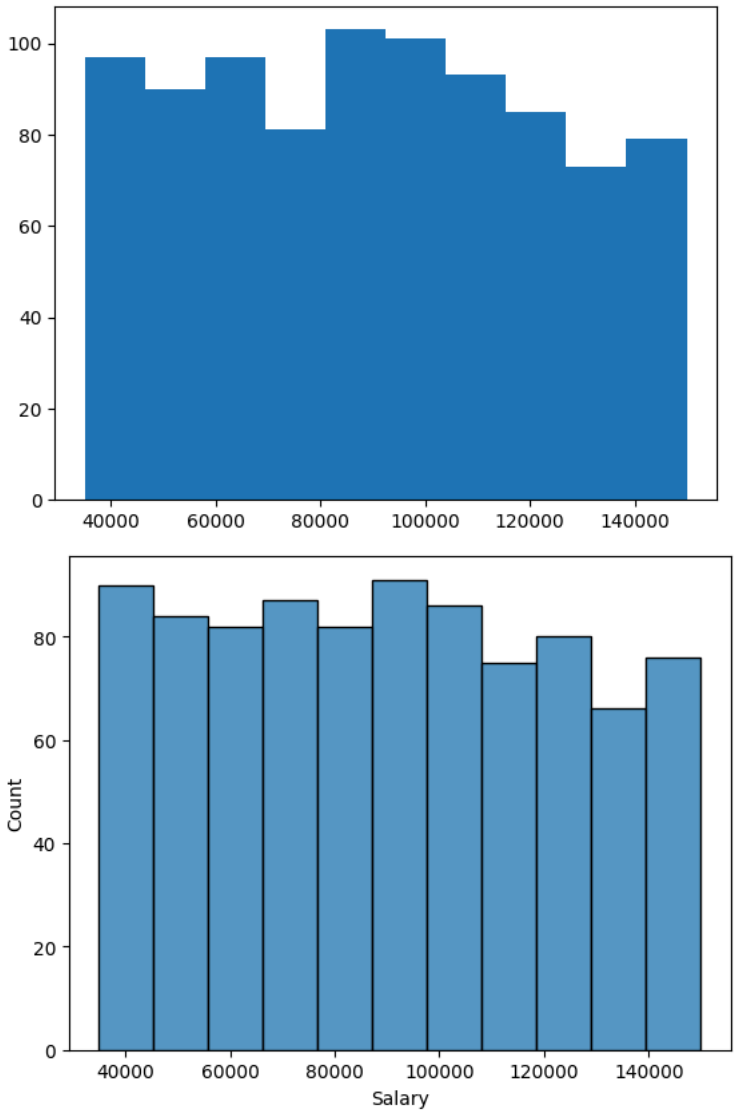
packages:

1. matplotlib
2. seaborn

Histogram -univariate -bivarite

use - data distributions - for numerical data

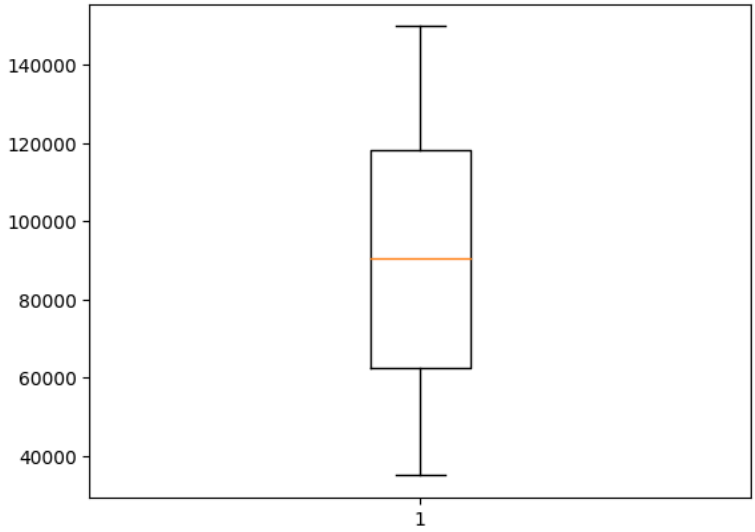
```
import seaborn as sns
import matplotlib.pyplot as plt

plt.hist(df['Salary'])
plt.show()

sns.histplot(x='Salary', data=df)
plt.show()
```



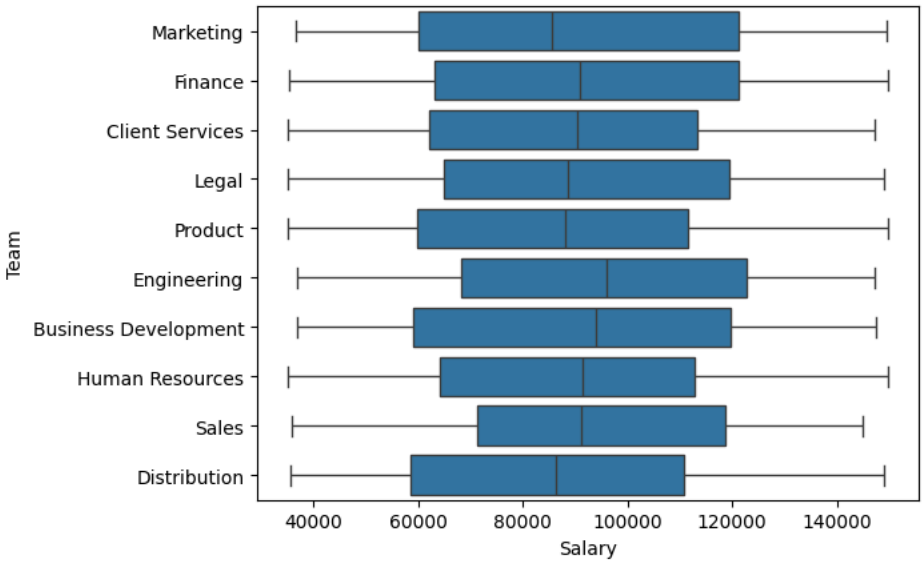
Box plot

univariate and bivariate analyses

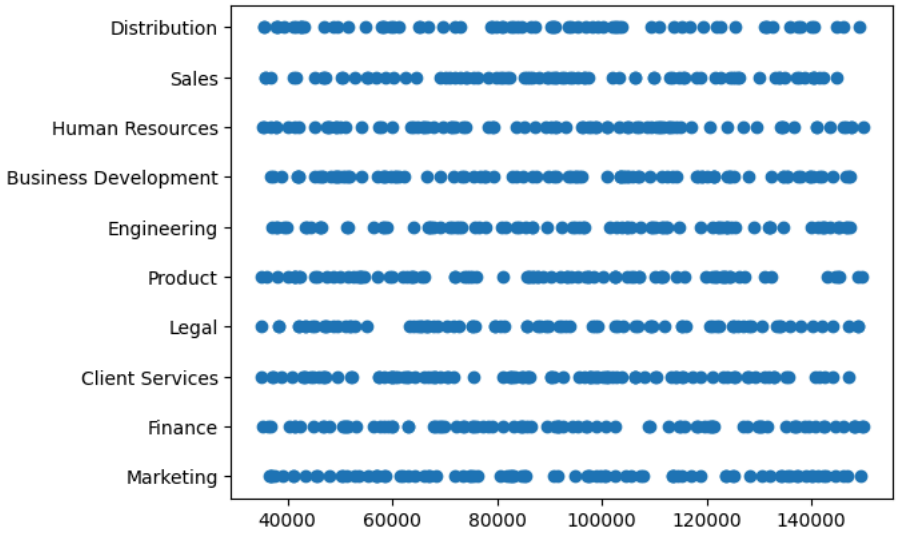
```
import seaborn as sns
import matplotlib.pyplot as plt

plt.boxplot(df['Salary'])
plt.show()
```




```
import seaborn as sns
import matplotlib.pyplot as plt

sns.boxplot(x = 'Salary', y='Team', data=df)
plt.show()
```




```
plt.scatter(df['Salary'], df['Team'])
plt.show()
```



What is the primary purpose of using Matplotlib and Seaborn in Exploratory Data Analysis (EDA)?
a) Perform statistical analysis

b) Handle missing data

c) Create meaningful data visualizations

d) Build machine learning models

Which of the following is a correct syntax to create a scatter plot using Matplotlib?
a) plt.scatter(x, y)

b) plt.plot(x, y, kind='scatter')

c) plt.create_scatter(x, y)

d) scatter.plot(x, y)

What does the term "boxplot" refer to in data visualization?
a) A plot with boxes and whiskers

b) A plot with only boxes

c) A plot with lines connecting data points

d) A plot with circular markers

Which Seaborn function is used to create a histogram?
a) sns.plot_histogram()

b) sns.histplot()

c) sns.create_hist()

d) sns.barplot()

What type of visualization is suitable for displaying the distribution of a single continuous variable?
a) Scatter plot

b) Bar chart

c) Pie chart

d) Histogram

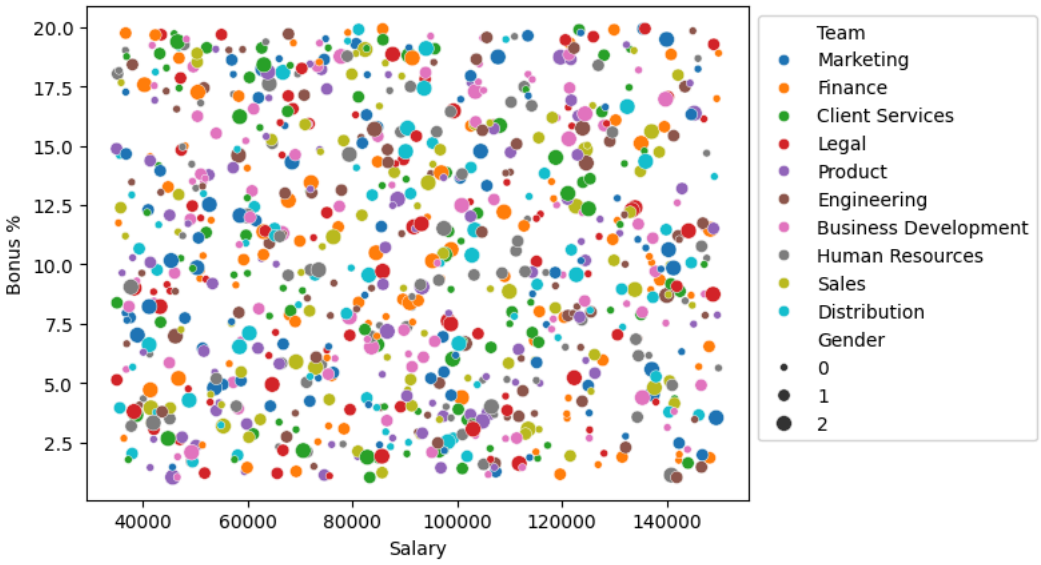
```
df.head()
```

	First Name	Gender	Start Date	Last Login Time	Salary	Bonus %	Senior Management	Team
0	Douglas	1	1993-08-06	12:42 PM	97308	6.945	True	Marketing
2	Maria	0	1993-04-23	11:17 AM	130590	11.858	False	Finance
3	Jerry	1	2005-03-04	1:00 PM	138705	9.340	True	Finance
4	Larry	1	1998-01-24	4:47 PM	101004	1.389	True	Client Services
5	Dennis	1	1987-04-18	1:35 AM	115163	10.125	False	Legal

Scatter

bivariate analysis

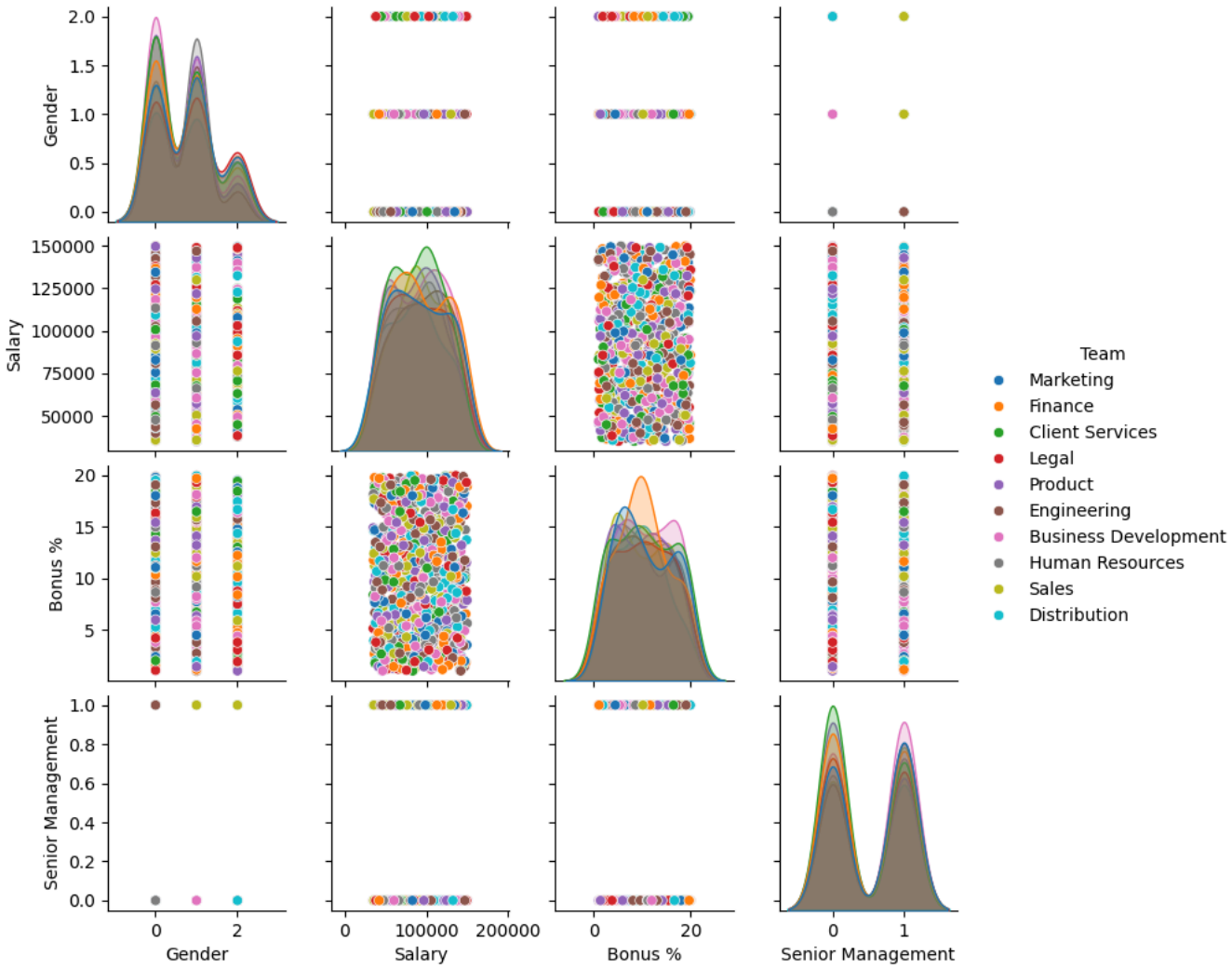
```
import seaborn as sns
import matplotlib.pyplot as plt

sns.scatterplot(x = 'Salary', y='Bonus %', data=df, hue='Team', size='Gender')
plt.legend(bbox_to_anchor =(1,1), loc=2)

plt.show()
```



Pairplot

- multivariate analysis
-

```
import seaborn as sns
import matplotlib.pyplot as plt

sns.pairplot(df, hue='Team', height=2)
plt.show()
```



Task 6 Outlier Handling

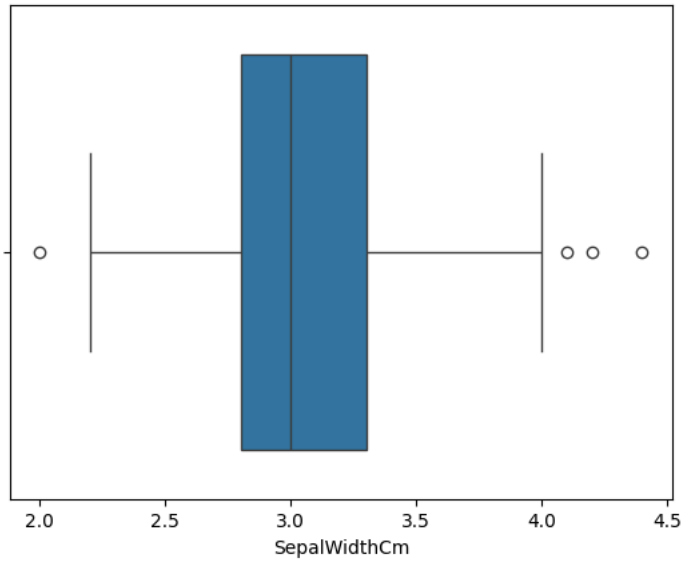
```
import pandas as pd

import seaborn as sns
import matplotlib.pyplot as plt

df2 = pd.read_csv('/content/Iris.csv')

df2.head()
```

	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

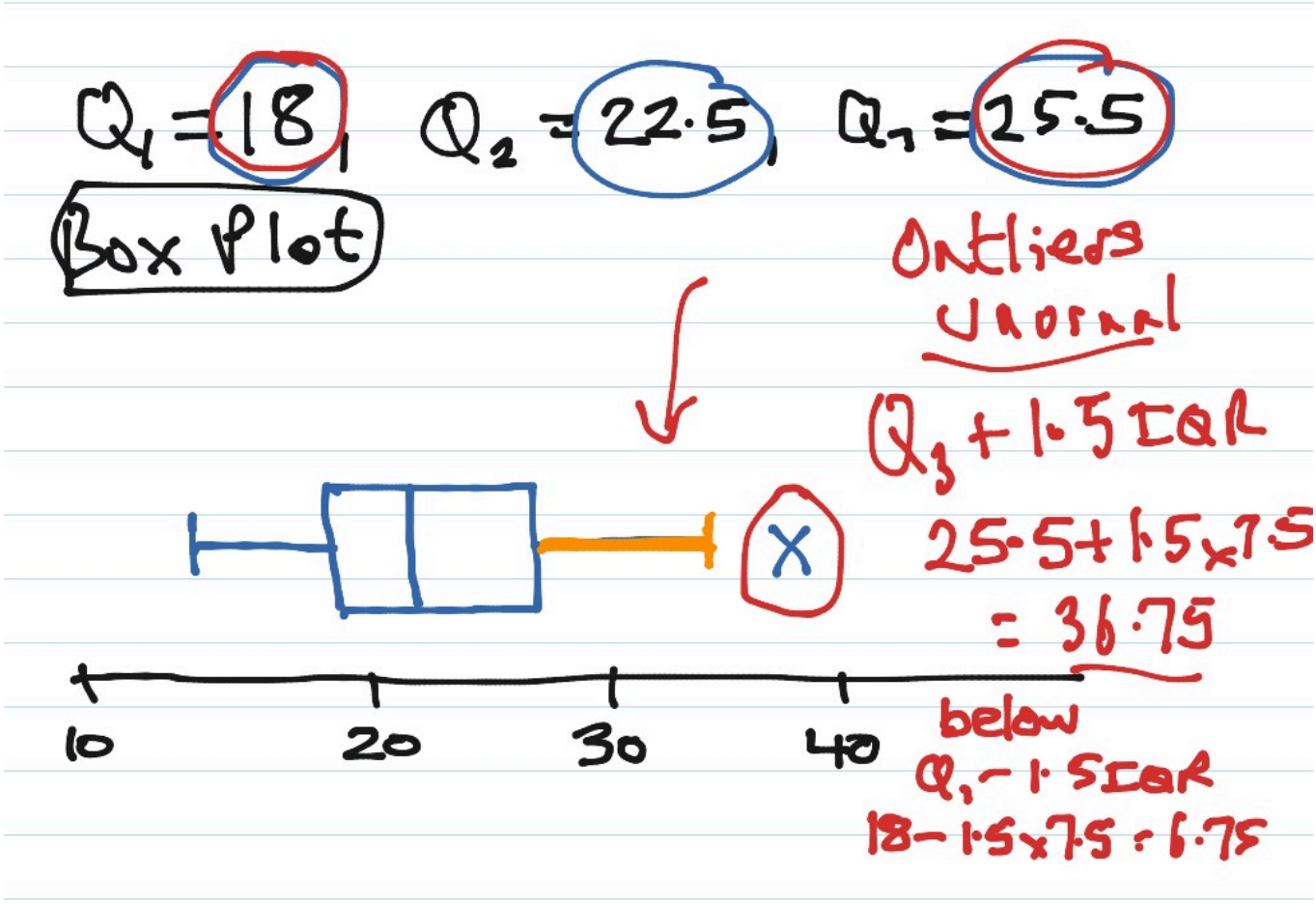
Next steps: Generate code with df2 View recommended plots

```
sns.boxplot(x = 'SepalWidthCm', data=df2)
```

```
<Axes: xlabel='SepalWidthCm'>
```




```
# Remove Outlier

Interquartile Range (IQR) :

Q1 -
Q2 -
Q3 -

IQR = Q3 - Q1

Data:
1, 19, 7, 6, 5, 9, 12, 27, 18, 2, 15

sort :
1, 2, 5, 6, 7, 9, 12, 15, 18, 19, 27

median
Q2 = 9

Q1 comes from lowest between value
Q1 = 5

Q3 comes from highest between values
Q3 = 18

IQR = 18 - 5 = 11
```




```
df2.head()
```

	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

Next steps: Generate code with df2 View recommended plots

```
#IQR
import numpy as np

Q1 = np.percentile(df2['SepalWidthCm'], 25, interpolation = 'midpoint')

Q3 = np.percentile(df2['SepalWidthCm'], 75, interpolation = 'midpoint')

IQR = Q3 - Q1


#upper bound
upper = np.where(df2['SepalWidthCm'] >= (Q3+1.5*IQR))

#lower bound
lower = np.where(df2['SepalWidthCm'] <= (Q3-1.5*IQR))

#remove the outliers:
df2.drop(upper[0], inplace=True)
df2.drop(lower[0], inplace=True)

print("New shape : ", df.shape)

sns.boxplot(x='SepalWidthCm', data=df2)
```

```
New shape :  (899, 8)
<Axes: xlabel='SepalWidthCm'>
```