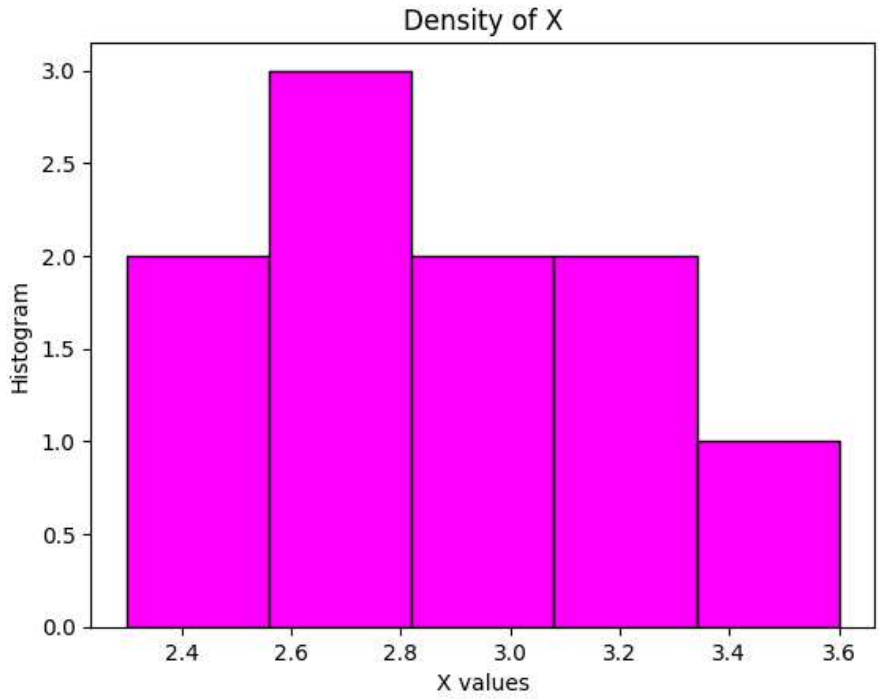
1. Computing the density of the data using a histogram with 5 bins.

```
import matplotlib.pyplot as plt
X=[2.3,2.5,3.6,2.8,3.1,2.9,3.2,2.7,2.8,3.0]
plt.hist(X, color='magenta', edgecolor='black', bins=5)
plt.xlabel("X values")
plt.ylabel("Histogram")
plt.title("Density of X")
```

```
Text(0.5, 1.0, 'Density of X')
```



2. Dependent and Independent variables dataset Mean, Median, Mode, Variance, Standard deviation, Range, Interquartile Range (IQR), Skewness, Kurtosis

```
import numpy as np
import pandas as pd
X = [4, 5, 8, 2, 4, 2, 5] #dependent variables
Y = [5, 6, 3, 8, 3, 7, 8] #independent variables
x = np.array(X)
```

```
y = np.array(Y)
Q1 = np.percentile(x, 25)
Q3 = np.percentile(x, 75)
IQR = Q3-Q1
print("Quartile1 of x: ", Q1)
print("Quartile3 of x: ", Q3)
print("Interquartile range of x: ", IQR)
print("Mean of x: ", np.mean(x))
print("Mean of y: ", np.mean(y))
print("Median of x: ", np.median(x))
print("Median of y: ", np.median(y))
print("Variance of x: ", np.var(x))
print("Variance of y: ", np.var(y))
print("Standard deviation of x: ", np.std(x))
print("Standard deviation of y: ", np.std(y))
print("Range of x: ", np.ptp(x))
print("Range of x: ", np.ptp(y))
c = np.bincount(x)
m = np.argmax(c)
C = np.bincount(y)
M = np.argmax(C)
print("Mode of x: ", m)
print("Mode of y: ", M)
q1 = np.percentile(y, 25)
q3 = np.percentile(y, 75)
iqr = q3-q1
print("Quartile1 of y: ", q1)
print("Quartile3 of y: ", q3)
print("Interquartile range of y: ", iqr)
series = pd.Series(x)
skewn = series.skew()
print("Skewness of x: ", skewn)
ser = pd.Series(y)
ske = ser.skew()
print("Skewness of y: ", ske)
ser = pd.Series(x)
kurt = ser.kurt()
print("Kurtosis of x: ", kurt)
wser = pd.Series(y)
krt = wser.kurt()
print("Kurtosis of y: ", krt)
```

```
Quartile1 of x:  3.0
Quartile3 of x:  5.0
Interquartile range of x:  2.0
Mean of x:  4.285714285714286
Mean of y:  5.714285714285714
Median of x:  4.0
Median of y:  6.0
Variance of x:  3.6326530612244894
```

```
Variance of y:  3.918367346938776
Standard deviation of x:  1.9059520091609048
Standard deviation of y:  1.979486637221574
Range of x:  6
Range of x:  5
Mode of x:  2
Mode of y:  3
Quartile1 of y:  4.0
Quartile3 of y:  7.5
Interquartile range of y:  3.5
Skewness of x:  0.749913842326791
Skewness of y:  -0.34201087050980566
Kurtosis of x:  0.977225097841182
Kurtosis of y:  -1.6898437500000005
```

3.Finding Mean, Median, Mode, Variance, Standard deviation, Range , Interquartile Range (IQR), Skewness ,Kurtosis of each feature of the given data.

```
import pandas as pd
d = pd.read_csv('/content/sample_data/california_housing_train.csv')
print(d)
```

```
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
0        -114.31     34.19                15.0       5612.0          1283.0
1        -114.47     34.40                19.0       7650.0          1901.0
2        -114.56     33.69                17.0        720.0           174.0
3        -114.57     33.64                14.0       1501.0           337.0
4        -114.57     33.57                20.0       1454.0           326.0
...          ...       ...                 ...          ...             ...
16995    -124.26     40.58                52.0       2217.0           394.0
16996    -124.27     40.69                36.0       2349.0           528.0
16997    -124.30     41.84                17.0       2677.0           531.0
16998    -124.30     41.80                19.0       2672.0           552.0
16999    -124.35     40.54                52.0       1820.0           300.0

       population  households  median_income  median_house_value
0          1015.0       472.0         1.4936             66900.0
1          1129.0       463.0         1.8200             80100.0
2           333.0       117.0         1.6509             85700.0
3           515.0       226.0         3.1917             73400.0
4           624.0       262.0         1.9250             65500.0
...           ...         ...            ...                 ...
16995       907.0       369.0         2.3571            111400.0
16996      1194.0       465.0         2.5179             79000.0
16997      1244.0       456.0         3.0313            103600.0
16998      1298.0       478.0         1.9797             85800.0
16999       806.0       270.0         3.0147             94600.0

[17000 rows x 9 columns]
```

```
print("Mean of longitude: ", d['longitude'].mean())
print("Median of longitude: ", d['longitude'].median())
print("Mode of longitude: ", d['longitude'].mode())
print("Variance of longitude: ", d['longitude'].var())
print("Standard deviation of longitude: ", d['longitude'].std())
print("Range of longitude: ", d['longitude'].max()-d['longitude'].min())
print("Interquartile range of longitude: ", d['longitude'].quantile(0.75)-d['longitude'].quantile(0.25))
print("Skewness of longitude: ", d['longitude'].skew())
print("Kurtosis of longitude: ", d['longitude'].kurtosis())
```

```
Mean of longitude:  -119.5621082352941
Median of longitude:  -118.49
Mode of longitude:  0   -118.31
Name: longitude, dtype: float64
Variance of longitude:  4.020692325480737
Standard deviation of longitude:  2.0051664084261778
Range of longitude:  10.039999999999992
Interquartile range of longitude:  3.7900000000000063
Skewness of longitude:  -0.30400297675663496
Kurtosis of longitude:  -1.3223296680648942
```

```
print("Mean of latitude: ", d['latitude'].mean())
print("Median of latitude: ", d['latitude'].median())
print("Mode of latitude: ", d['latitude'].mode())
print("Variance of latitude: ", d['latitude'].var())
print("Standard deviation of latitude: ", d['latitude'].std())
print("Range of latitude: ", d['latitude'].max()-d['latitude'].min())
print("Interquartile range of latitude: ", d['latitude'].quantile(0.75)-d['latitude'].quantile(0.25))
print("Skewness of latitude: ", d['latitude'].skew())
print("Kurtosis of latitude: ", d['latitude'].kurtosis())
```

```
Mean of latitude:  35.62522470588235
Median of latitude:  34.25
Mode of latitude:  0    34.06
Name: latitude, dtype: float64
Variance of latitude:  4.568221397824785
Standard deviation of latitude:  2.1373397946570836
Range of latitude:  9.410000000000004
Interquartile range of latitude:  3.789999999999999
Skewness of latitude:  0.4718011203585246
Kurtosis of latitude:  -1.1122264930558603
```

```
print("Mean of housing_median_age: ", d['housing_median_age'].mean())
print("Median of housing_median_age: ", d['housing_median_age'].median())
print("Mode of housing_median_age: ", d['housing_median_age'].mode())
print("Variance of housing_median_age: ", d['housing_median_age'].var())
print("Standard deviation of housing_median_age: ", d['housing_median_age'].std())
print("Range of housing_median_age: ", d['housing_median_age'].max()-d['housing_median_age'].min())
print("Interquartile range of housing_median_age: ", d['housing_median_age'].quantile(0.75)-d['housing_median_age'].quantile(0.25))
print("Skewness of housing_median_age: ", d['housing_median_age'].skew())
print("Kurtosis of housing_median_age: ", d['housing_median_age'].kurtosis)
```

```
Mean of housing_median_age:  28.58935294117647
Median of housing_median_age:  29.0
Mode of housing_median_age:  0    52.0
Name: housing_median_age, dtype: float64
Variance of housing_median_age:  158.4309825802902
Standard deviation of housing_median_age:  12.586936981660399
Range of housing_median_age:  51.0
Interquartile range of housing_median_age:  19.0
Skewness of housing_median_age:  0.06489403293452067
Kurtosis of housing_median_age:  <bound method Series.kurt of 0        15.0
1        19.0
2        17.0
3        14.0
4        20.0
         ...
16995    52.0
16996    36.0
16997    17.0
16998    19.0
16999    52.0
Name: housing_median_age, Length: 17000, dtype: float64>
```

```
print("Mean of total_rooms: ", d['total_rooms'].mean())
print("Median of total_rooms: ", d['total_rooms'].median())
print("Mode of total_rooms: ", d['total_rooms'].mode())
print("Variance of total_rooms: ", d['total_rooms'].var())
print("Standard deviation of total_rooms: ", d['total_rooms'].std())
print("Range of total_rooms: ", d['total_rooms'].max()-d['total_rooms'].min())
print("Interquartile range of total_rooms: ", d['total_rooms'].quantile(0.75)-d['total_rooms'].quantile(0.25))
print("Skewness of total_rooms: ", d['total_rooms'].skew())
print("Kurtosis of total_rooms: ", d['total_rooms'].kurtosis)
```

```
Mean of total_rooms:  2643.664411764706
Median of total_rooms:  2127.0
Mode of total_rooms:  0    1582.0
Name: total_rooms, dtype: float64
Variance of total_rooms:  4752169.234335496
Standard deviation of total_rooms:  2179.947071452767
Range of total_rooms:  37935.0
Interquartile range of total_rooms:  1689.25
Skewness of total_rooms:  4.002729998658741
```

```
Kurtosis of total_rooms:  <bound method Series.kurt of 0        5612.0
1        7650.0
2         720.0
3        1501.0
4        1454.0
          ...
16995    2217.0
16996    2349.0
16997    2677.0
16998    2672.0
16999    1820.0
Name: total_rooms, Length: 17000, dtype: float64>
```

```
print("Mean of total_bedrooms: ", d['total_bedrooms'].mean())
print("Median of total_bedrooms: ", d['total_bedrooms'].median())
print("Mode of total_bedrooms: ", d['total_bedrooms'].mode)
print("Variance of total_bedrooms: ", d['total_bedrooms'].var())
print("Standard deviation of total_bedrooms: ", d['total_bedrooms'].std())
print("Range of total_bedrooms: ", d['total_bedrooms'].max()-d['total_bedrooms'].min())
print("Interquartile range of total_bedrooms: ", d['total_bedrooms'].quantile(0.75)-d['total_bedrooms'].quantile(0.25))
print("Skewness of total_bedrooms: ", d['total_bedrooms'].skew())
print("Kurtosis of total_bedrooms: ", d['total_bedrooms'].kurtosis)
```

```
Mean of total_bedrooms:  539.4108235294118
Median of total_bedrooms:  434.0
Mode of total_bedrooms:  <bound method Series.mode of 0        1283.0
1        1901.0
2         174.0
3         337.0
4         326.0
          ...
16995     394.0
16996     528.0
16997     531.0
16998     552.0
16999     300.0
Name: total_bedrooms, Length: 17000, dtype: float64>
Variance of total_bedrooms:  177661.78768212663
Standard deviation of total_bedrooms:  421.4994515798646
Range of total_bedrooms:  6444.0
Interquartile range of total_bedrooms:  351.25
Skewness of total_bedrooms:  3.3226367155099132
Kurtosis of total_bedrooms:  <bound method Series.kurt of 0        1283.0
1        1901.0
2         174.0
3         337.0
4         326.0
          ...
16995     394.0
16996     528.0
16997     531.0
16998     552.0
```

```
16999     300.0
Name: total_bedrooms, Length: 17000, dtype: float64>
```

```
print("Mean of population: ", d['population'].mean())
print("Median of population: ", d['population'].median())
print("Mode of population: ", d['population'].mode())
print("Variance of population: ", d['population'].var())
print("Standard deviation of population: ", d['population'].std())
print("Range of population: ", d['population'].max()-d['population'].min())
print("Interquartile range of population: ", d['population'].quantile(0.75)-d['population'].quantile(0.25))
print("Skewness of population: ", d['population'].skew())
print("Kurtosis of population: ", d['population'].kurtosis)
```

```
Mean of population:  1429.5739411764705
Median of population:  1167.0
Mode of population:  0    891.0
Name: population, dtype: float64
Variance of population:  1317566.4158512817
Standard deviation of population:  1147.8529591595266
Range of population:  35679.0
Interquartile range of population:  931.0
Skewness of population:  5.187211878247974
Kurtosis of population:  <bound method Series.kurt of 0        1015.0
1        1129.0
2         333.0
3         515.0
4         624.0
          ...
16995     907.0
16996    1194.0
16997    1244.0
16998    1298.0
16999     806.0
Name: population, Length: 17000, dtype: float64>
```

```
print("Mean of households: ", d['households'].mean())
print("Median of households: ", d['households'].median())
print("Mode of households: ", d['households'].mode())
print("Variance of households: ", d['households'].var())
print("Standard deviation of households: ", d['households'].std())
print("Range of households: ", d['households'].max()-d['households'].min())
print("Interquartile range of households: ", d['households'].quantile(0.75)-d['households'].quantile(0.25))
print("Skewness of households: ", d['households'].skew())
print("Kurtosis of households: ", d['households'].kurtosis)
```

```
Mean of households:  501.2219411764706
Median of households:  409.0
Mode of households:  0    306.0
1    386.0
Name: households, dtype: float64
```

```
Variance of households:  147856.27705252904
Standard deviation of households:  384.5208408559009
Range of households:  6081.0
Interquartile range of households:  323.25
Skewness of households:  3.3426683625335154
Kurtosis of households:  <bound method Series.kurt of 0        472.0
1        463.0
2        117.0
3        226.0
4        262.0
         ...
16995    369.0
16996    465.0
16997    456.0
16998    478.0
16999    270.0
Name: households, Length: 17000, dtype: float64>
```

```
print("Mean of median_income: ", d['median_income'].mean())
print("Median of median_income: ", d['median_income'].median())
print("Mode of median_income: ", d['median_income'].mode())
print("Variance of median_income: ", d['median_income'].var())
print("Standard deviation of median_income: ", d['median_income'].std())
print("Range of median_income: ", d['median_income'].max()-d['median_income'].min())
print("Interquartile range of median_income: ", d['median_income'].quantile(0.75)-d['median_income'].quantile(0.25))
print("Skewness of median_income: ", d['median_income'].skew())
print("Kurtosis of median_income: ", d['median_income'].kurtosis)
```

```
Mean of median_income:  3.8835781000000007
Median of median_income:  3.5446
Mode of median_income:  0    3.125
Name: median_income, dtype: float64
Variance of median_income:  3.6410612986326623
Standard deviation of median_income:  1.9081565183791036
Range of median_income:  14.5002
Interquartile range of median_income:  2.2006250000000005
Skewness of median_income:  1.6266930979614043
Kurtosis of median_income:  <bound method Series.kurt of 0        1.4936
1        1.8200
2        1.6509
3        3.1917
4        1.9250
         ...
16995    2.3571
16996    2.5179
16997    3.0313
16998    1.9797
16999    3.0147
Name: median_income, Length: 17000, dtype: float64>
```

```
print("Mean of median_house_value: ", d['median_house_value'].mean())
```

```
print("Median of median_house_value:  ", d['median_house_value'].median())
print("Mode of median_house_value: ", d['median_house_value'].mode())
print("Variance of median_house_value: ", d['median_house_value'].var())
print("Standard deviation of median_house: ", d['median_house_value'].std())
print("Range of median_house_value: ", d['median_house_value'].max()-d['median_house_value'].min())
print("Interquartile range of median_house_value: ", d['median_house_value'].quantile(0.75)-d['median_house_value'].quantile(0.25))
print("Skewness of median_house_value: ", d['median_house_value'].skew())
print("Kurtosis of median_house_value: ", d['median_house_value'].kurtosis)
```

```
Mean of median_house_value:  207300.91235294117
Median of median_house_value:  180400.0
Mode of median_house_value:  0    500001.0
Name: median_house_value, dtype: float64
Variance of median_house_value:  13452233601.427578
Standard deviation of median_house:  115983.76438720885
Range of median_house_value:  485002.0
Interquartile range of median_house_value:  145600.0
Skewness of median_house_value:  0.9730366334725522
Kurtosis of median_house_value:  <bound method Series.kurt of 0         66900.0
1         80100.0
2         85700.0
3         73400.0
4         65500.0
           ...
16995    111400.0
16996     79000.0
16997    103600.0
16998     85800.0
16999     94600.0
Name: median_house_value, Length: 17000, dtype: float64>
```