```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

# Q1 and Q2) Loading the dataset

```
df=pd.read_csv('/content/penguins_size.csv')
df.head()
```

```
  species     island  culmen_length_mm  culmen_depth_mm
flipper_length_mm  \
0  Adelie  Torgersen              39.1             18.7
181.0
1  Adelie  Torgersen              39.5             17.4
186.0
2  Adelie  Torgersen              40.3             18.0
195.0
3  Adelie  Torgersen               NaN              NaN
NaN
4  Adelie  Torgersen              36.7             19.3
193.0

   body_mass_g     sex
0       3750.0    MALE
1       3800.0  FEMALE
2       3250.0  FEMALE
3          NaN     NaN
4       3450.0  FEMALE
```

# Q3) Visualizations

## 1. Univariate Analysis

1-Pie Chart

```
df['species'].nunique()
```

```
3
```

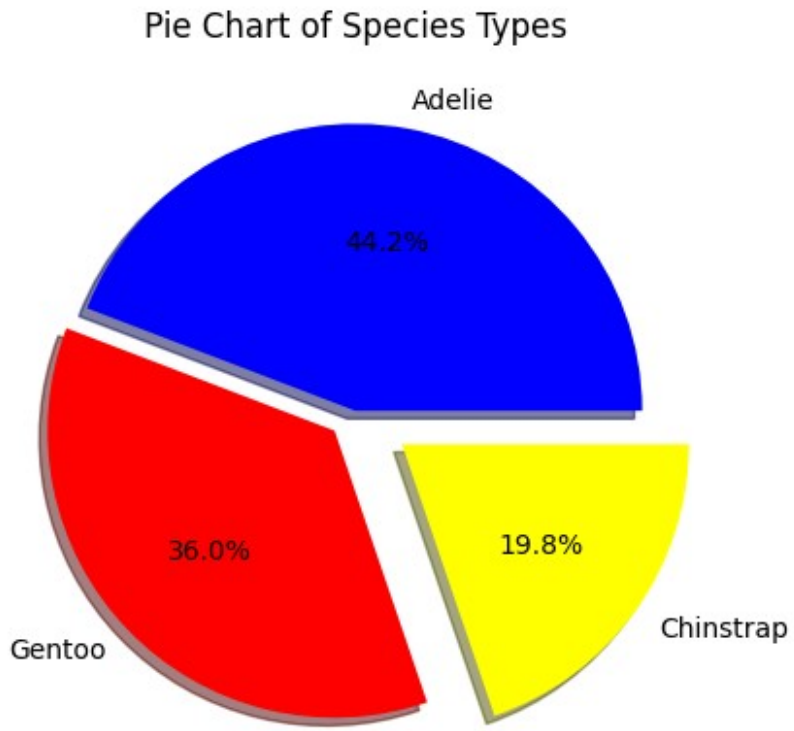
```
df['species'].unique()
```

```
array(['Adelie', 'Chinstrap', 'Gentoo'], dtype=object)
```

```
df['species'].value_counts()
```

```
Adelie       152
Gentoo       124
Chinstrap     68
Name: species, dtype: int64
```

```
plt.pie(df['species'].value_counts(),
[0,0.1,0.2],labels=['Adelie','Gentoo','Chinstrap'],autopct='%1.1f%
%',shadow=True,colors=['blue','red','yellow'])
plt.title('Pie Chart of Species Types')
plt.show()
```




```
df['island'].nunique()
```

```
3
```

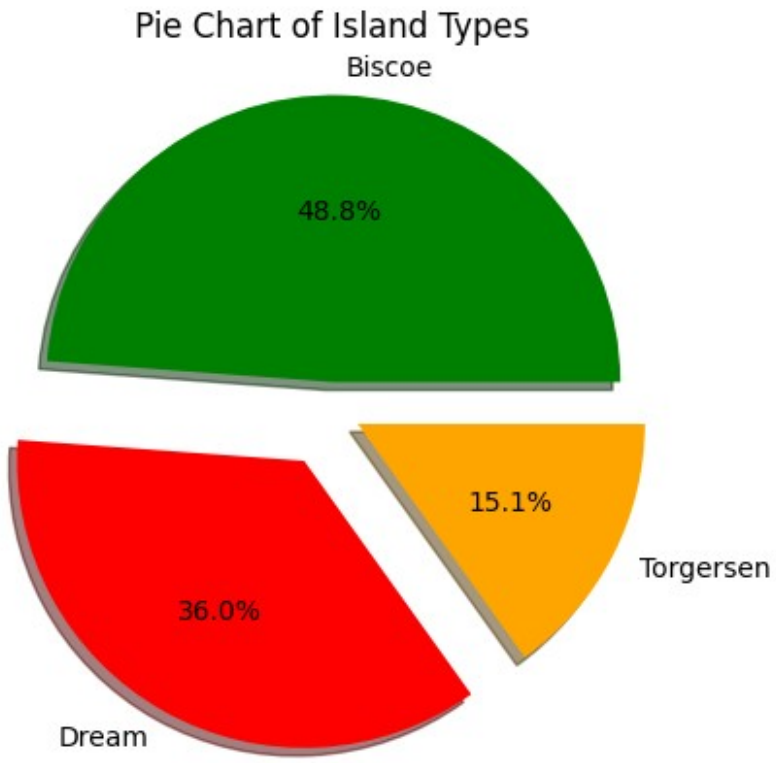
```
df['island'].unique()
```

```
array(['Torgersen', 'Biscoe', 'Dream'], dtype=object)
```

```
df['island'].value_counts()
```

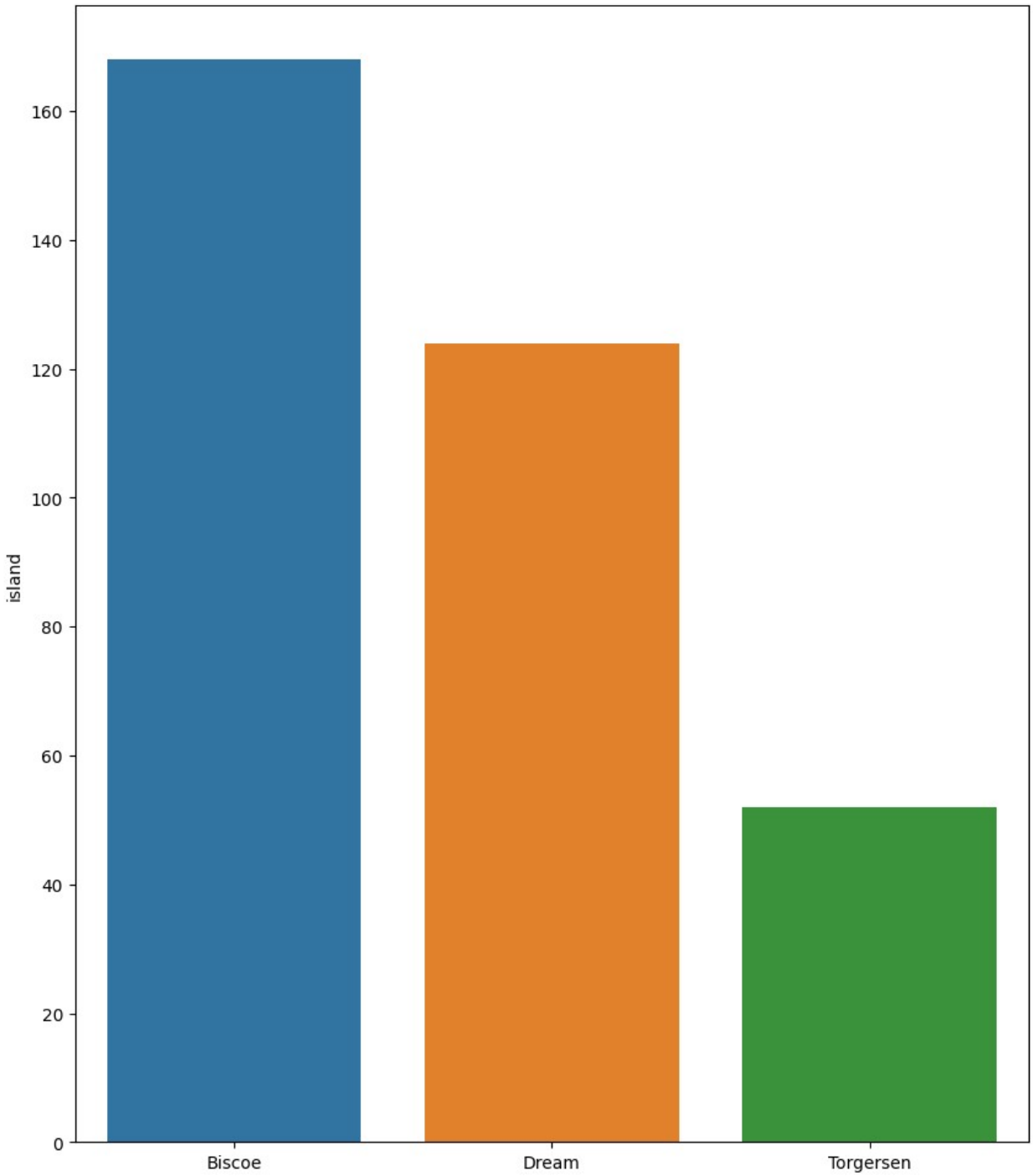
```
Biscoe       168
Dream        124
Torgersen     52
Name: island, dtype: int64
```

```
plt.pie(df['island'].value_counts(),
[0.1,0.2,0.1],labels=['Biscoe','Dream','Torgersen'],autopct='%1.1f%
%',shadow=True,colors=['green','red','orange'])
plt.title('Pie Chart of Island Types')
plt.show()
```

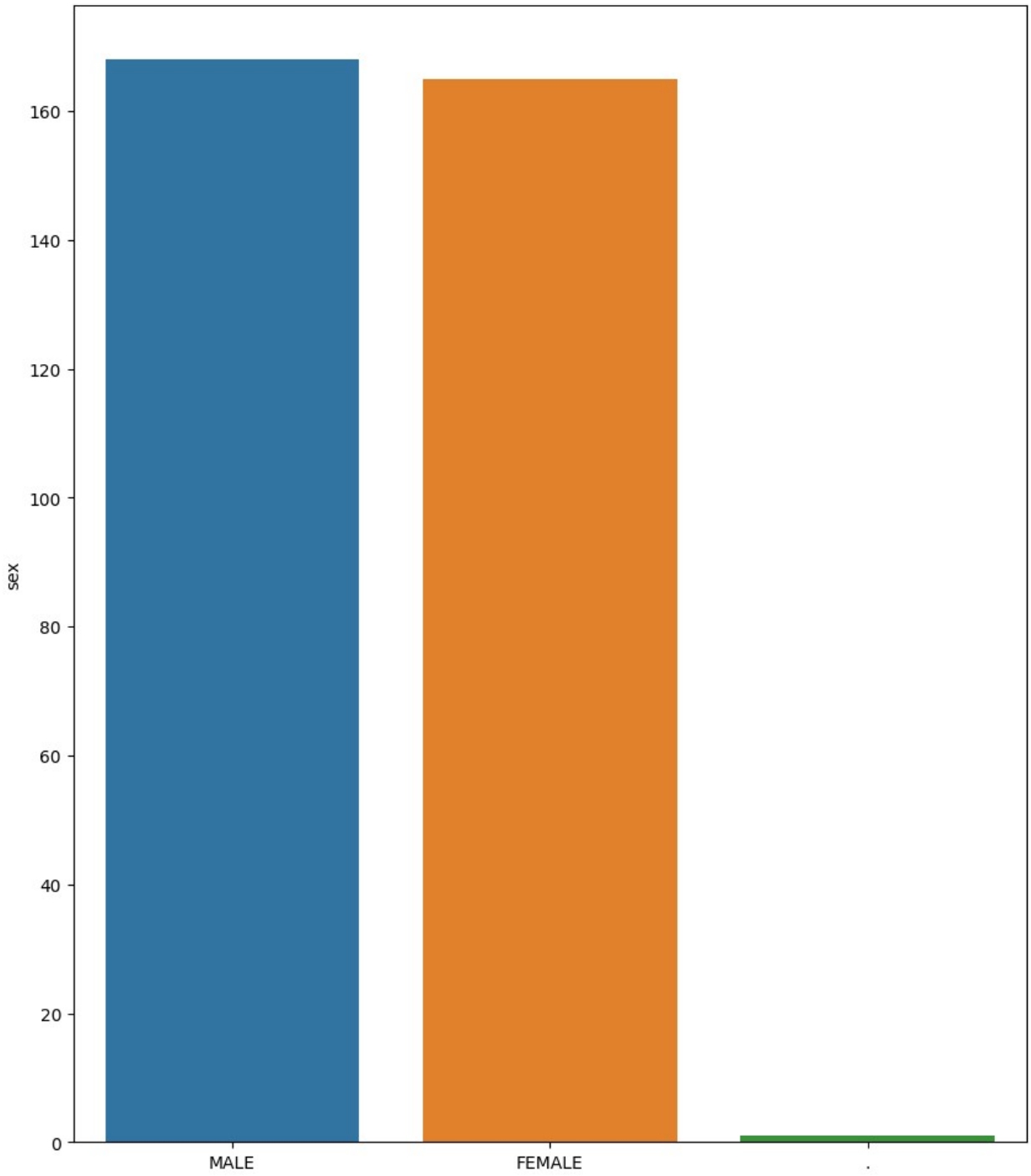



2-Bar Plot

```
plt.figure(figsize=(10,12))
sns.barplot(x=df['island'].value_counts().index,y=df['island'].value_c
ounts())
plt.show()
```



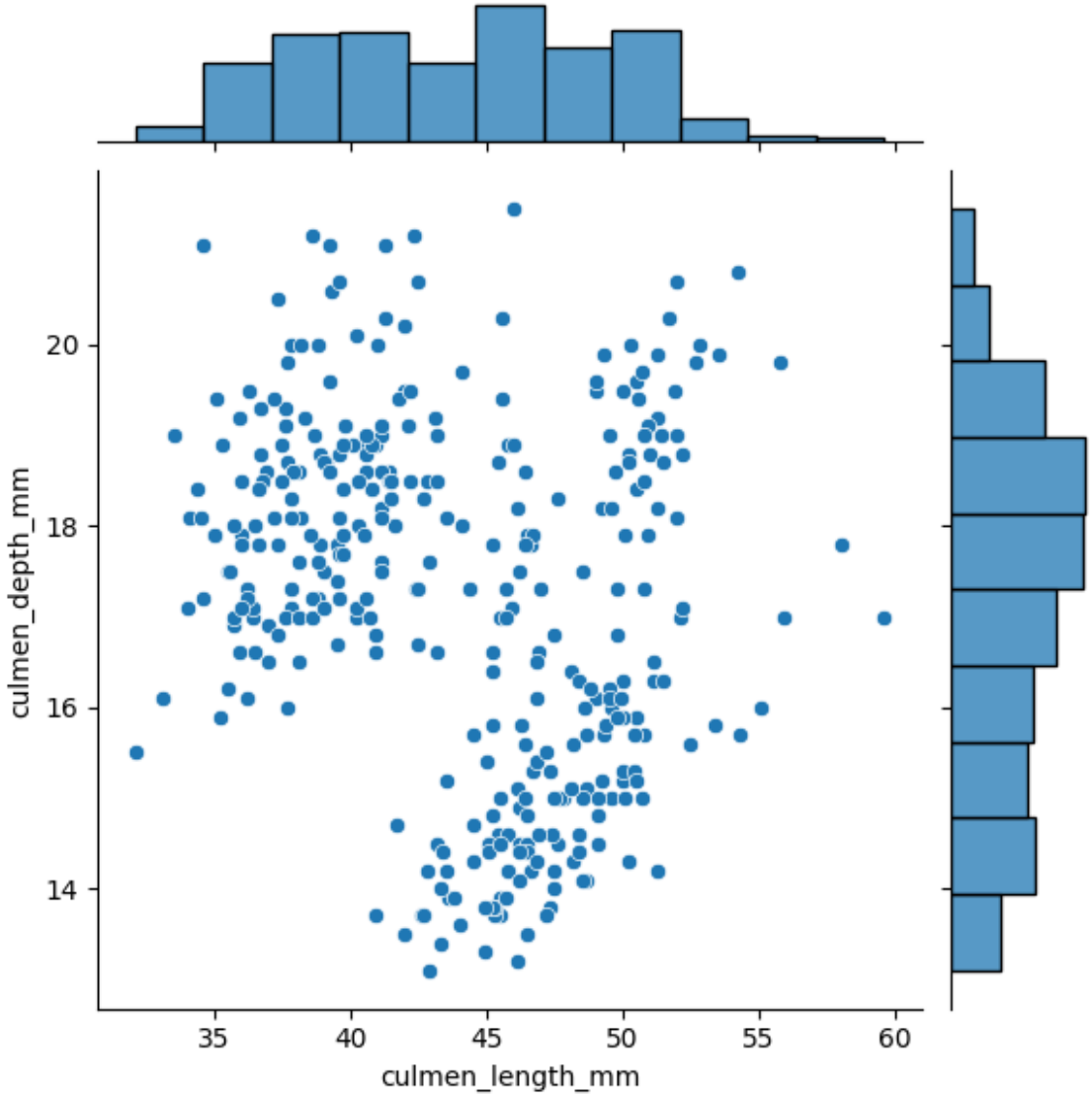

```
plt.figure(figsize=(10,12))
sns.barplot(x=df['sex'].value_counts().index,y=df['sex'].value_counts(
))
plt.show()
```



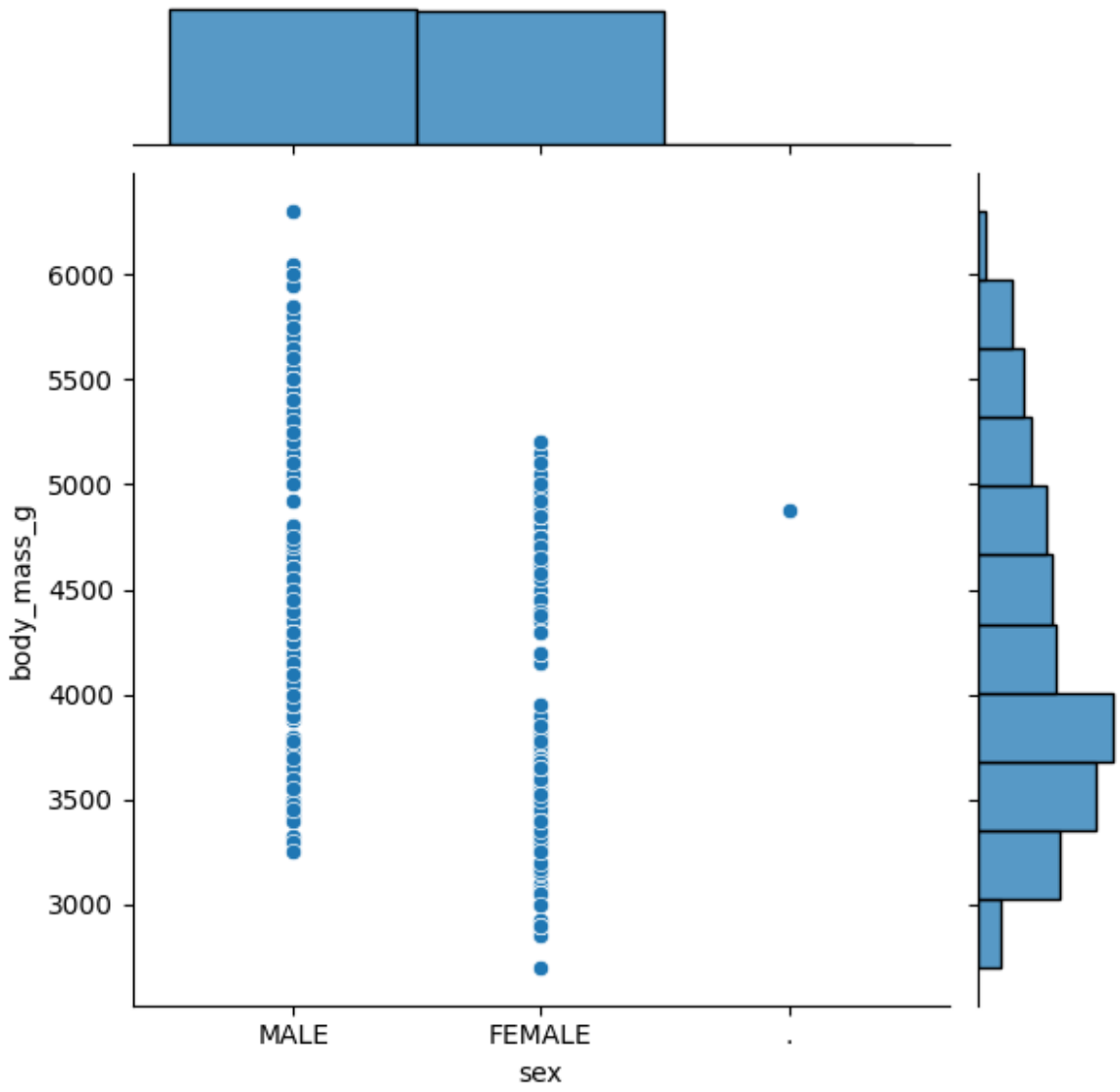

## 2. Bivariate Analysis

1-Joint Plot

```
sns.jointplot(x="culmen_length_mm",y="culmen_depth_mm",data=df)
plt.show()
```

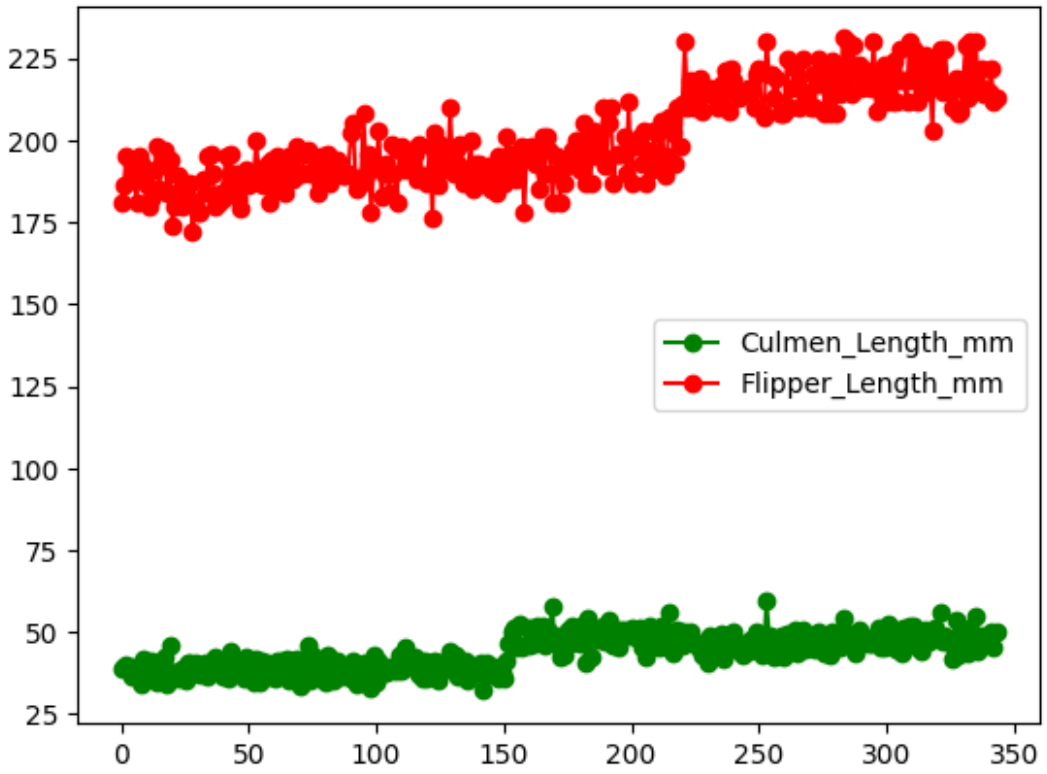



```
sns.jointplot(x="sex",y="body_mass_g",data=df)
plt.show()
```

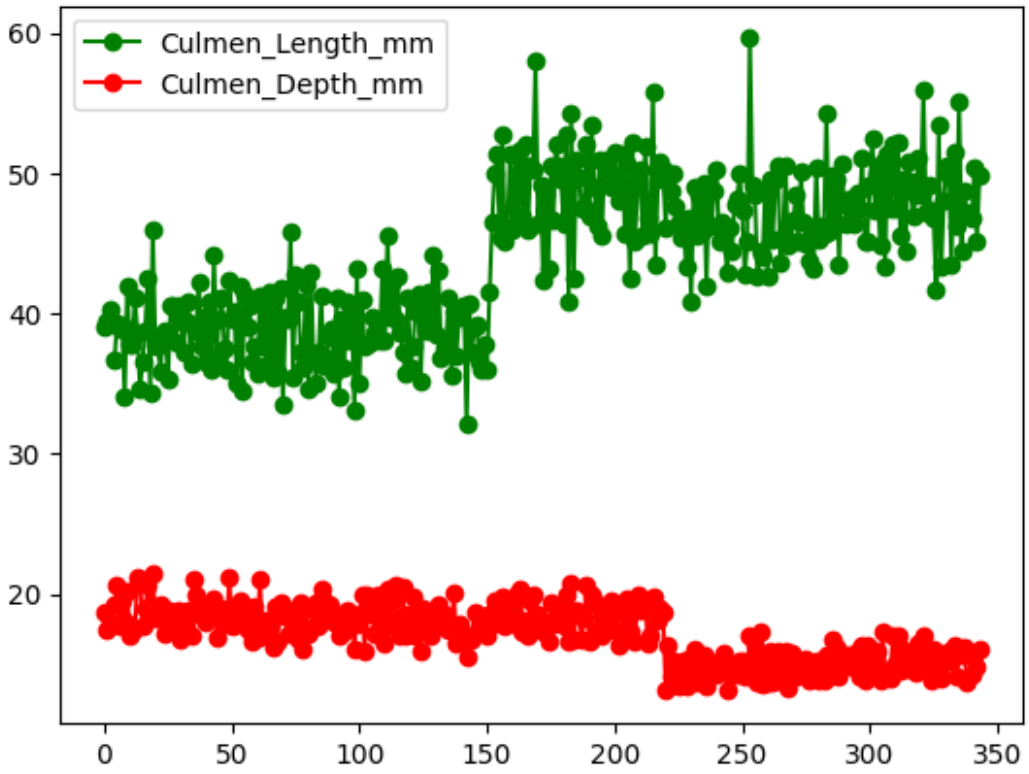



2-Line plot

```
line1=df['culmen_length_mm']
line2=df['flipper_length_mm']
line3=df['sex']
plt.plot(line1,'o-g')
plt.plot(line2,'o-r')
plt.legend(['Culmen_Length_mm','Flipper_Length_mm'])
plt.show()
```



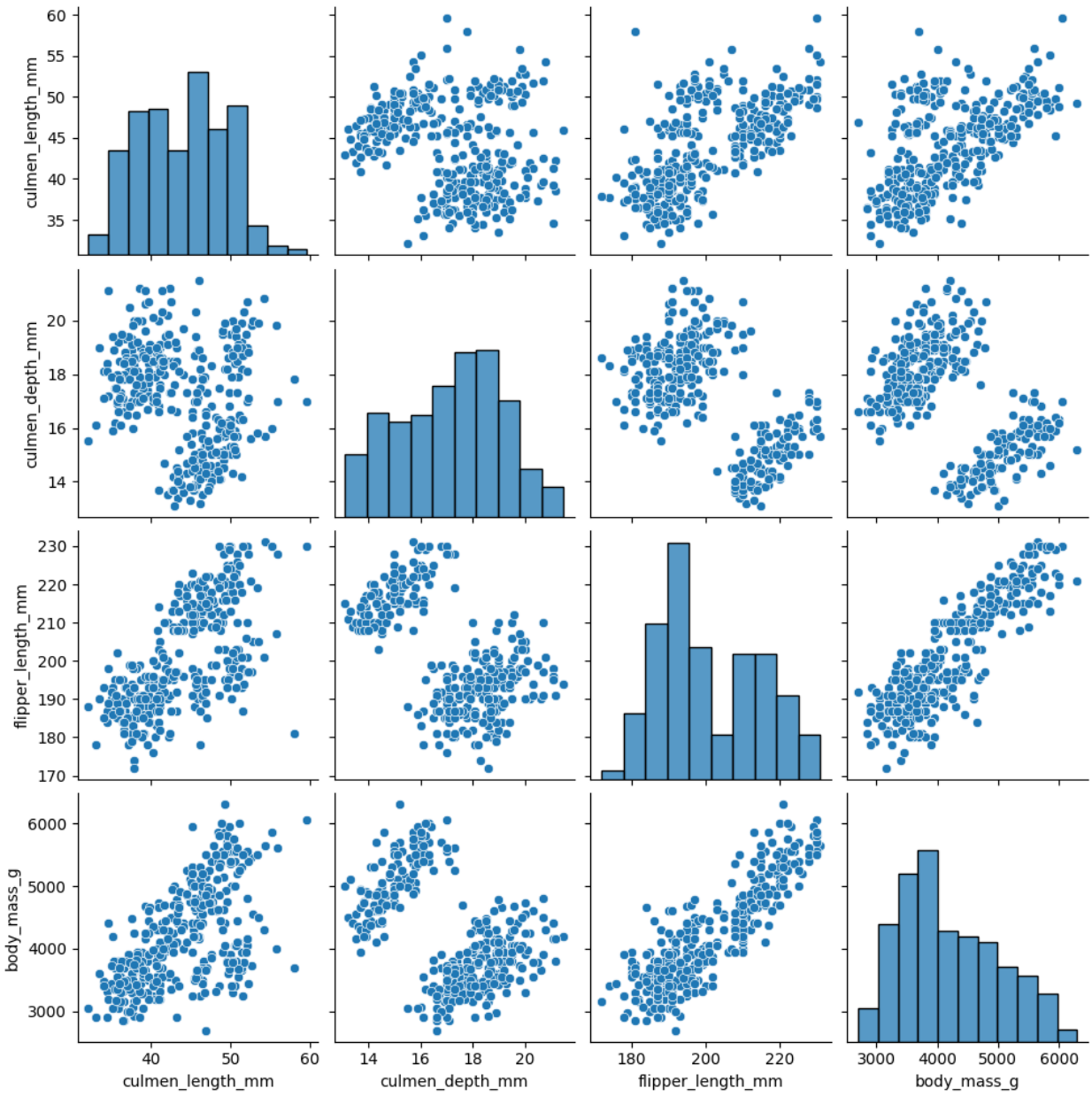

```
line1=df['culmen_length_mm']
line2=df['culmen_depth_mm']
line3=df['sex']
plt.plot(line1,'o-g')
plt.plot(line2,'o-r')
plt.legend(['Culmen_Length_mm','Culmen_Depth_mm'])
plt.show()
```




## 3. Multivariate Analysis

1-Pair Plot

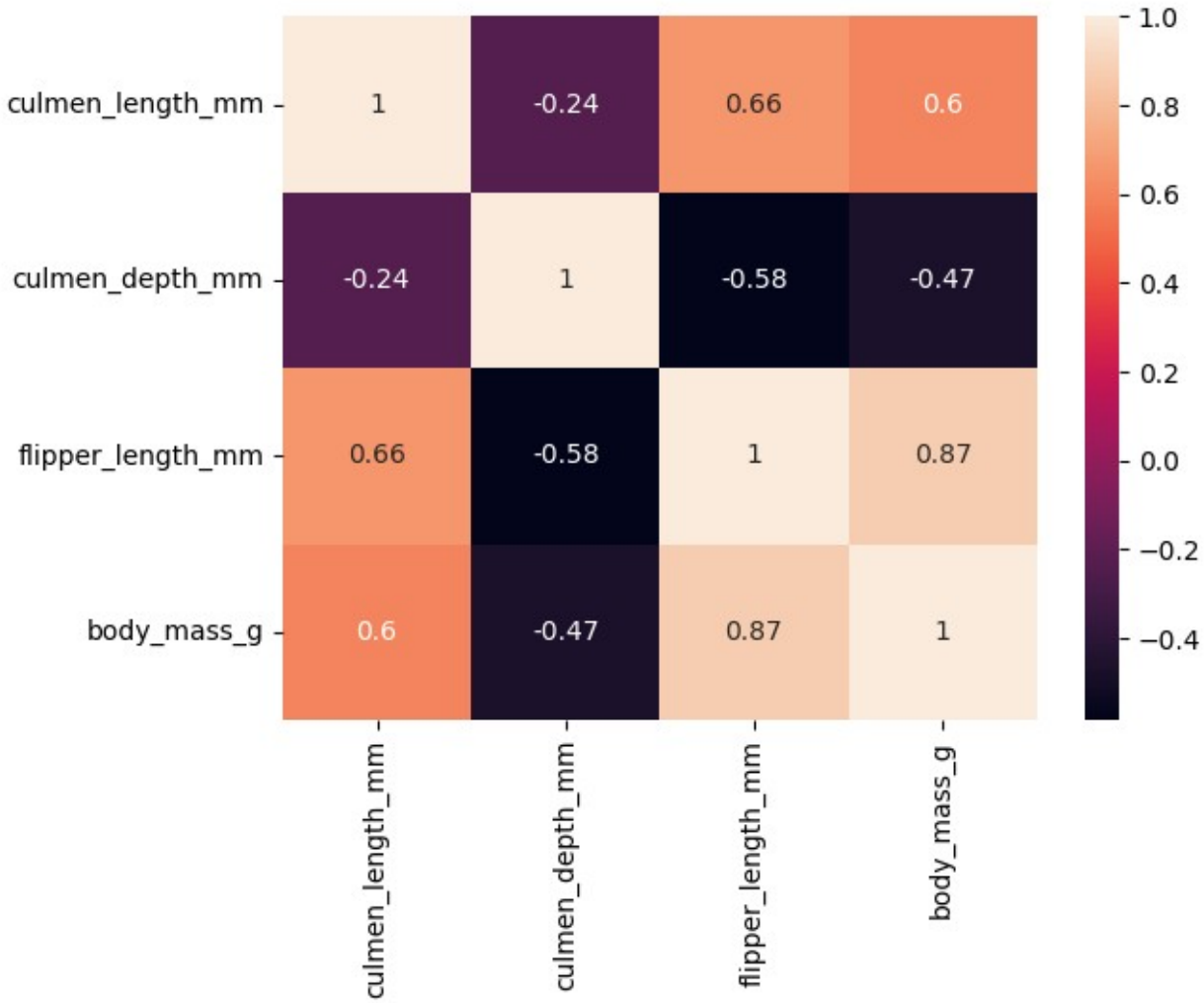
```
sns.pairplot(df)
plt.show()
```




2- Heat Map

```
sns.heatmap(df.corr(),annot=True)
plt.show()
```

```
<ipython-input-50-f6412ee67fb3>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it
will default to False. Select only valid columns or specify the value
of numeric_only to silence this warning.
  sns.heatmap(df.corr(),annot=True)
```




## Q4) Descriptive Statistics

```
df.describe()
```

| | culmen_length_mm | culmen_depth_mm | flipper_length_mm | body_mass_g |
|---|---|---|---|---|
| count | 342.000000 | 342.000000 | 342.000000 | 342.000000 |
| mean | 43.921930 | 17.151170 | 200.915205 | 4201.754386 |
| std | 5.459584 | 1.974793 | 14.061714 | 801.954536 |
| min | 32.100000 | 13.100000 | 172.000000 | 2700.000000 |
| 25% | 39.225000 | 15.600000 | 190.000000 | 3550.000000 |
| 50% | 44.450000 | 17.300000 | 197.000000 | 4050.000000 |
| 75% | 48.500000 | 18.700000 | 213.000000 | |

```
4750.000000
max           59.600000         21.500000          231.000000
6300.000000
```

## Q5) Checking and Dealing with Missing Values

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

```
species               0
island                0
culmen_length_mm      2
culmen_depth_mm       2
flipper_length_mm     2
body_mass_g           2
sex                  10
dtype: int64
```

```
df['culmen_length_mm'].fillna(df['culmen_length_mm'].median(),inplace=True)
df['culmen_depth_mm'].fillna(df['culmen_depth_mm'].median(),inplace=True)
df['flipper_length_mm'].fillna(df['flipper_length_mm'].median(),inplace=True)
df['body_mass_g'].fillna(df['body_mass_g'].median(),inplace=True)
df['sex'].fillna(df['sex'].mode()[0],inplace=True)
```

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

```
species              0
island               0
culmen_length_mm     0
culmen_depth_mm      0
flipper_length_mm    0
body_mass_g          0
sex                  0
dtype: int64
```

```
df['sex'].value_counts()
```

```
MALE      178
FEMALE    165
.           1
Name: sex, dtype: int64
```

```
df['sex'].replace('.',df['sex'].mode()[0])
```

```
0        MALE
1      FEMALE
2      FEMALE
3        MALE
4      FEMALE
```

```
        ...
339      MALE
340    FEMALE
341      MALE
342    FEMALE
343      MALE
Name: sex, Length: 344, dtype: object
```

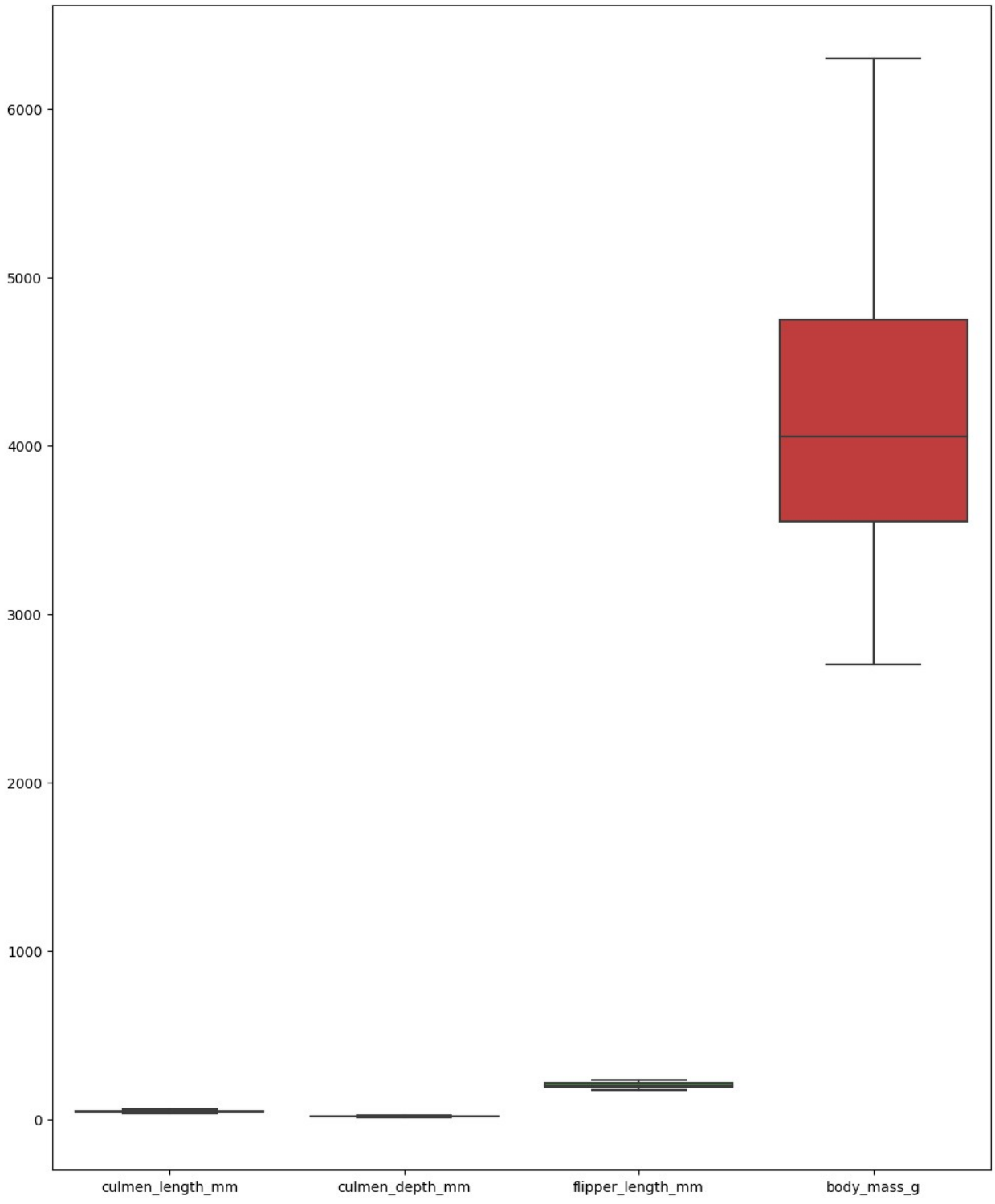
```
df.isnull().sum()
```

```
species              0
island               0
culmen_length_mm     0
culmen_depth_mm      0
flipper_length_mm    0
body_mass_g          0
sex                  0
dtype: int64
```

## Q6) Outlier Detection and Replacement

```
plt.figure(figsize=(12,15))
sns.boxplot(df)
```

```
<Axes: >
```




```
# No outliers, hence no replacement required
```

## Q8) Encoding of Categorical Columns

```
from sklearn.preprocessing import LabelEncoder

le=LabelEncoder()

df['species']=le.fit_transform(df['species'])
df['island']=le.fit_transform(df['island'])
df['sex']=le.fit_transform(df['sex'])
df.head()
```

```
   species  island  culmen_length_mm  culmen_depth_mm
flipper_length_mm  \
0        0       2              39.10             18.7
181.0
1        0       2              39.50             17.4
186.0
2        0       2              40.30             18.0
195.0
3        0       2              44.45             17.3
197.0
4        0       2              36.70             19.3
193.0

   body_mass_g  sex
0       3750.0    2
1       3800.0    1
2       3250.0    1
3       4050.0    2
4       3450.0    1
```

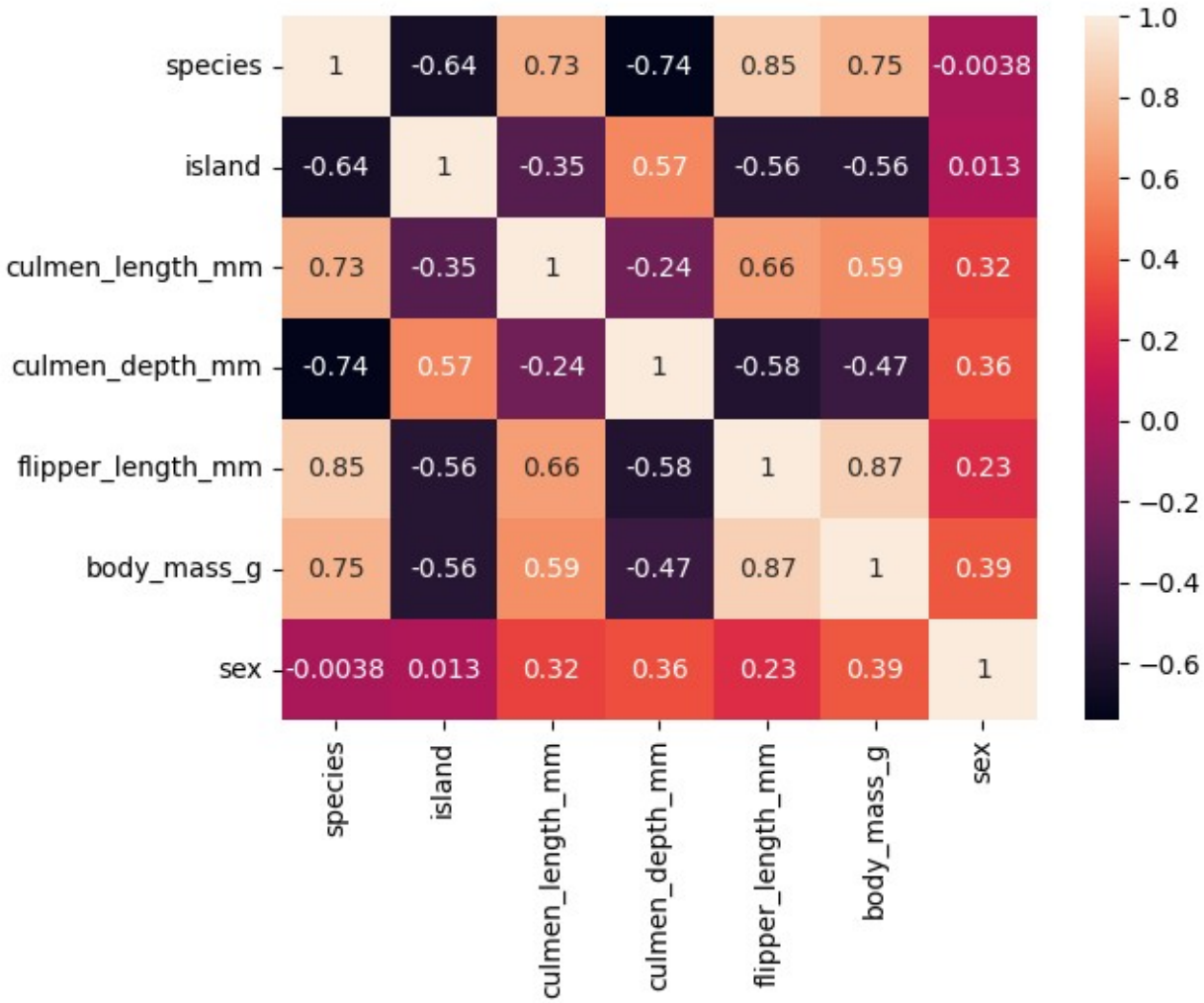
## Q7) Correlation of independent variable with target variable

```
df.corr().species.sort_values(ascending=False)
```

```
species              1.000000
flipper_length_mm    0.850819
body_mass_g          0.747547
culmen_length_mm     0.728706
sex                 -0.003823
island              -0.635659
culmen_depth_mm     -0.741282
Name: species, dtype: float64
```

```
sns.heatmap(df.corr(),annot=True)
```

```
<Axes: >
```




## Q9) Splitting dataframe into independent and dependent variables

```
X=df.drop(columns=['species'],axis=1)
X.head()
```

```
   island  culmen_length_mm  culmen_depth_mm  flipper_length_mm
body_mass_g  \
0       2              39.10             18.7              181.0
3750.0
1       2              39.50             17.4              186.0
3800.0
2       2              40.30             18.0              195.0
3250.0
3       2              44.45             17.3              197.0
4050.0
4       2              36.70             19.3              193.0
3450.0
```

```
   sex
0    2
1    1
2    1
3    2
4    1
```

```
Y=df['species']
Y.head()
```

```
0    0
1    0
2    0
3    0
4    0
Name: species, dtype: int64
```

## Q10) Data Scaling

```
from sklearn.preprocessing import StandardScaler

scale=StandardScaler()

X_scaled=pd.DataFrame(scale.fit_transform(X),columns=X.columns)
X_scaled.head()
```

```
     island  culmen_length_mm  culmen_depth_mm  flipper_length_mm  \
0  1.844076         -0.887622         0.787289          -1.420541
1  1.844076         -0.814037         0.126114          -1.063485
2  1.844076         -0.666866         0.431272          -0.420786
3  1.844076          0.096581         0.075255          -0.277964
4  1.844076         -1.329133         1.092447          -0.563608

   body_mass_g       sex
0    -0.564625  0.960230
1    -0.502010 -1.017729
2    -1.190773 -1.017729
3    -0.188936  0.960230
4    -0.940314 -1.017729
```

## Q11) Train Test Split

```
from sklearn.model_selection import train_test_split

X_train,X_test,Y_train,Y_test=train_test_split(X_scaled,Y,test_size=0.
2,random_state=0)
```

## Q12) Training and Testing data shape

```
X_train.shape
```

```
(275, 6)
```

```
X_test.shape
```

```
(69, 6)
```

```
Y_train.shape
```

```
(275,)
```

```
Y_test.shape
```

```
(69,)
```