assignment-3

September 14, 2023

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
df=pd.read_csv('/content/penguins_size.csv')
df.head()
```

[1]:

	species	island	culmen_length_mm	culmen_depth_mm	flipper_length_mm	body_mass_g	sex
0	Adelie	Torgersen	39.1	18.7	181.0	3750.0	MALE
1	Adelie	Torgersen	39.5	17.4	186.0	3800.0	FEMALE
2	Adelie	Torgersen	40.3	18.0	195.0	3250.0	FEMALE
3	Adelie	Torgersen	NaN	NaN	NaN	NaN	NaN
4	Adelie	Torgersen	36.7	19.3	193.0	3450.0	FEMALE

[2]:
```
df.shape
```

[2]:
```
(344, 7)
```

[3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 344 entries, 0 to 343
Data columns (total 7 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   species            344 non-null    object
 1   island             344 non-null    object
 2   culmen_length_mm   342 non-null    float64
 3   culmen_depth_mm    342 non-null    float64
 4   flipper_length_mm  342 non-null    float64
 5   body_mass_g        342 non-null    float64
```

```
 6   sex                334 non-null    object
dtypes: float64(4), object(3)
memory usage: 18.9+ KB
```

[4]:
```
df.describe()
```

[4]:
```
       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
```

[5]:
```
df.isnull().sum()
```

[5]:
```
species               0
island                0
culmen_length_mm      2
culmen_depth_mm       2
flipper_length_mm     2
body_mass_g           2
sex                  10
dtype: int64
```

[6]:
```
df.sex.value_counts()
```

[6]:
```
MALE      168
FEMALE    165
.           1
Name: sex, dtype: int64
```

[7]:
```
df['sex'] = df['sex'].replace(".","MALE")
```

[8]:
```
df.sex.value_counts()
```

[8]:
```
MALE      169
FEMALE    165
Name: sex, dtype: int64
```

[9]:
```
df['sex']=df['sex'].fillna("MALE")
```

[10]:
```
df.island.value_counts()
```

[10]:
```
Biscoe       168
Dream        124
Torgersen     52
Name: island, dtype: int64
```

[11]:
```
df.species.value_counts()
```

[11]:
```
Adelie       152
Gentoo       124
Chinstrap     68
Name: species, dtype: int64
```

[12]:
```
df.isnull().sum()
```

[12]:
```
species              0
island               0
culmen_length_mm     2
culmen_depth_mm      2
flipper_length_mm    2
body_mass_g          2
sex                  0
dtype: int64
```

[13]:
```
df.median()
```

```
<ipython-input-13-6d467abf240d>:1: FutureWarning: The default value of
numeric_only in DataFrame.median is deprecated. In a future version, it will
default to False. In addition, specifying 'numeric_only=None' is deprecated.
Select only valid columns or specify the value of numeric_only to silence this
warning.
  df.median()
```

[13]:
```
culmen_length_mm       44.45
culmen_depth_mm        17.30
flipper_length_mm     197.00
body_mass_g          4050.00
dtype: float64
```

[14]:
```
df=df.fillna(df.median())
```

```
<ipython-input-14-42d29455c84b>:1: FutureWarning: The default value of
numeric_only in DataFrame.median is deprecated. In a future version, it will
default to False. In addition, specifying 'numeric_only=None' is deprecated.
Select only valid columns or specify the value of numeric_only to silence this
warning.
  df=df.fillna(df.median())
```

[15]:
```
df.isnull().sum()
```

[15]:
```
species              0
island               0
culmen_length_mm     0
culmen_depth_mm      0
flipper_length_mm    0
body_mass_g          0
sex                  0
dtype: int64
```

[16]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 344 entries, 0 to 343
Data columns (total 7 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   species            344 non-null    object
 1   island             344 non-null    object
 2   culmen_length_mm   344 non-null    float64
 3   culmen_depth_mm    344 non-null    float64
 4   flipper_length_mm  344 non-null    float64
 5   body_mass_g        344 non-null    float64
 6   sex                344 non-null    object
dtypes: float64(4), object(3)
memory usage: 18.9+ KB
```

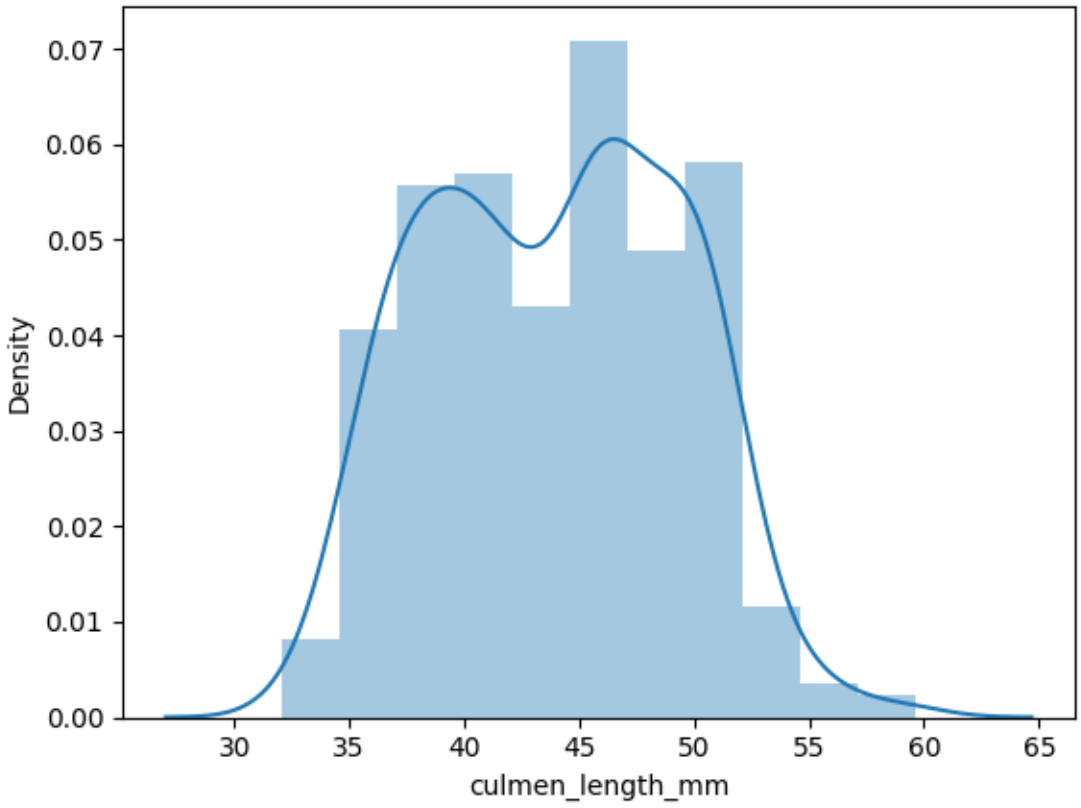
##Visualization

Univariate Analysis

[17]:
```
sns.distplot(df.culmen_length_mm)
```

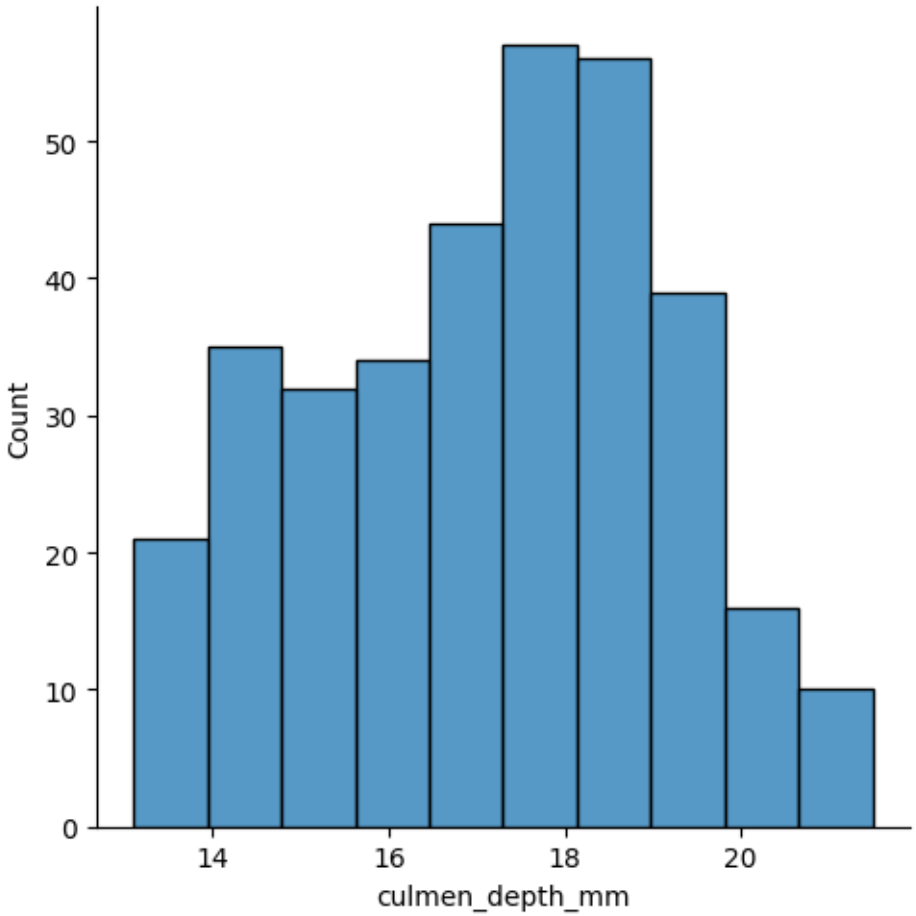
```
<ipython-input-17-24e9b5890c61>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df.culmen_length_mm)
```

[17]:
```
<Axes: xlabel='culmen_length_mm', ylabel='Density'>
```



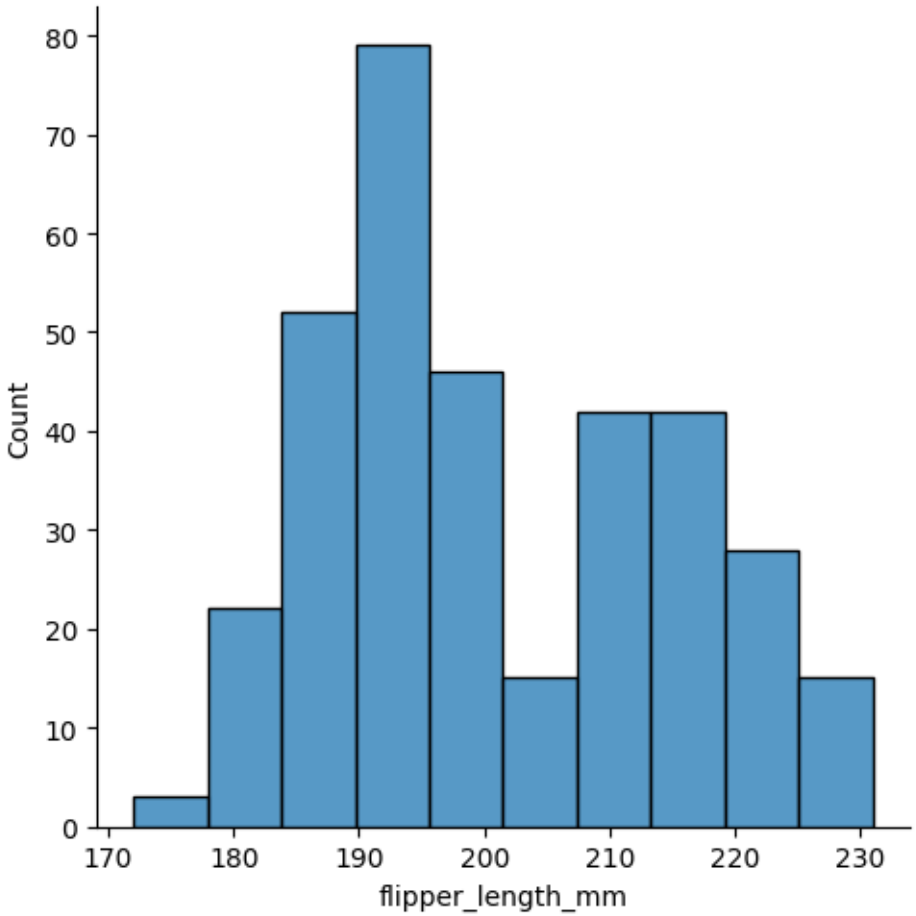
[18]:
```
sns.displot(df.culmen_depth_mm)
```

[18]: <seaborn.axisgrid.FacetGrid at 0x7bc769ee4460>

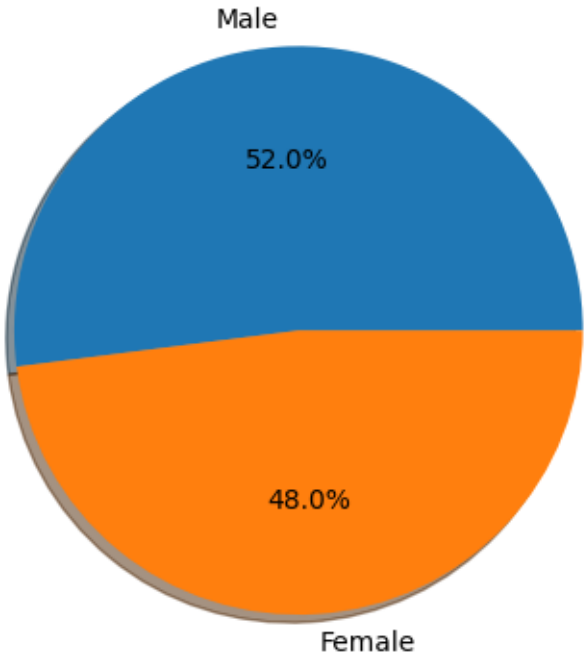


[19]:
```
sns.displot(df.flipper_length_mm)
```

[19]: <seaborn.axisgrid.FacetGrid at 0x7bc769e4bf40>



[20]:
```
plt.pie(df.sex.value_counts(),[0.,0.],labels=['Male','Female'],autopct="%1.
  ↪1f%%",shadow=True)
plt.show()
```



0.1 Correlation of independent variables with the target

[21]:
```
correlation_matrix=df.corr()
```

```
<ipython-input-21-76b5ce6ad480>: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.
  correlation_matrix=df.corr()
```

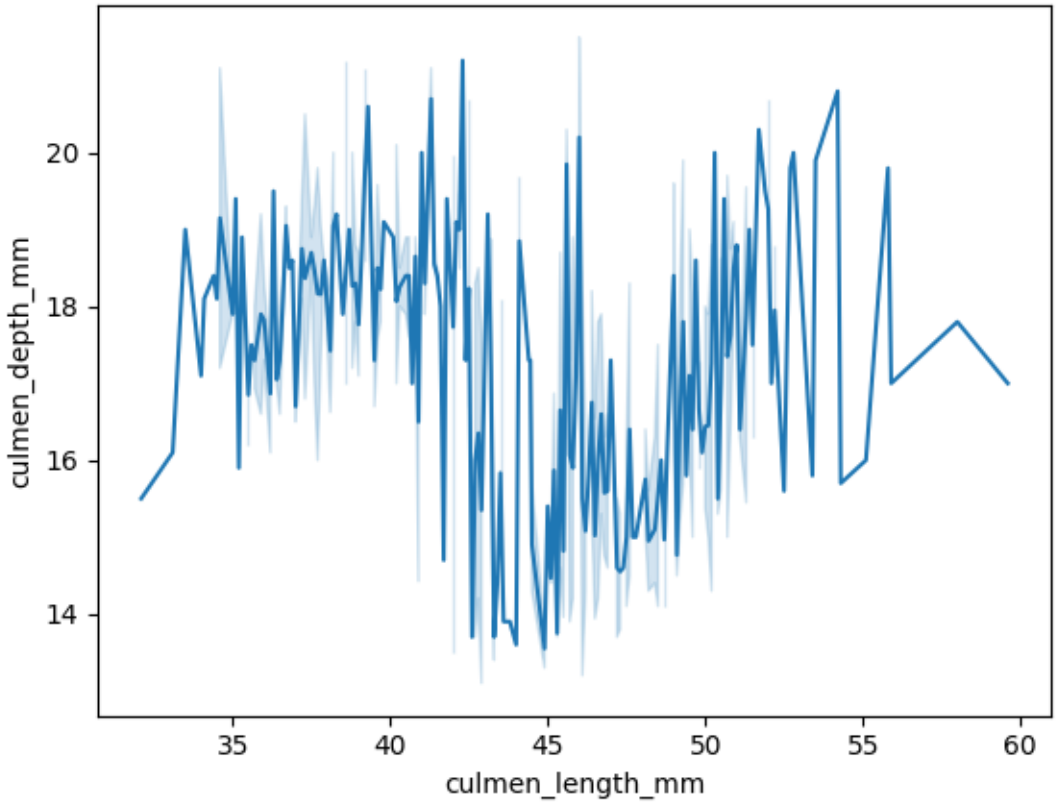
[40]:
```
correlation_with_target=correlation_matrix['culmen_length_mm'].
 ↪sort_values(ascending=False)
print(correlation_with_target)
```

```
culmen_length_mm     1.000000
flipper_length_mm    0.655858
body_mass_g          0.594925
culmen_depth_mm     -0.235000
Name: culmen_length_mm, dtype: float64
```

##Bivariate Analysis

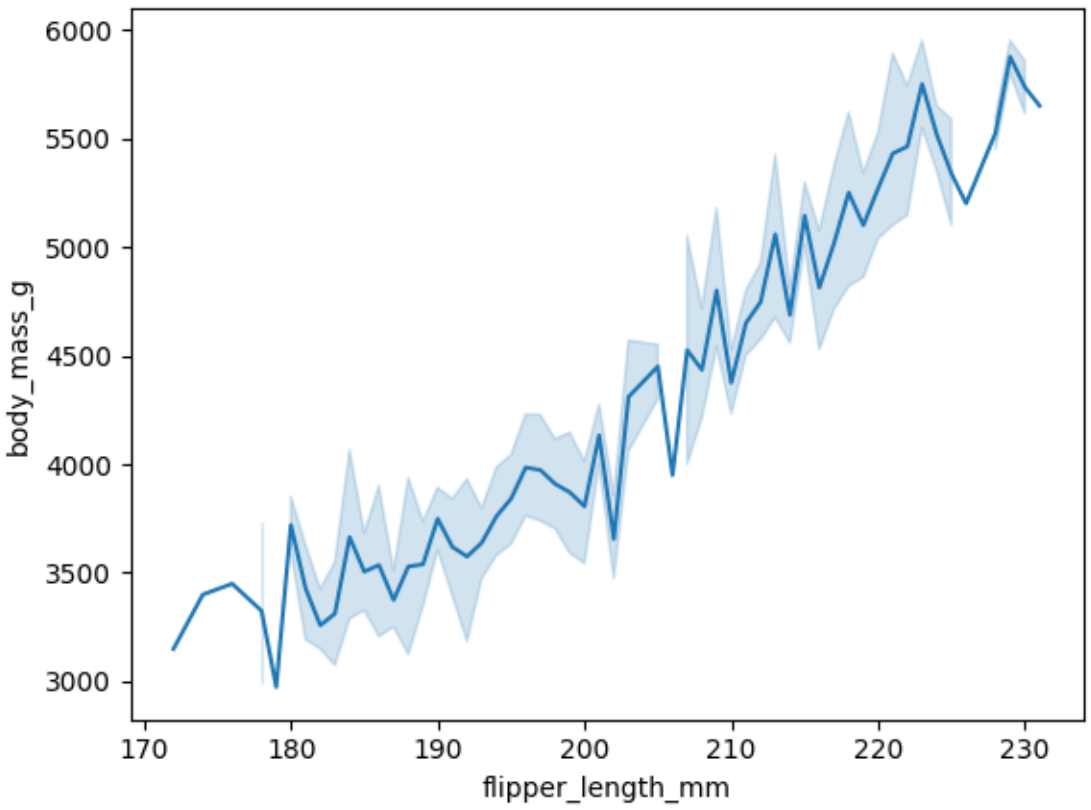
[22]:
```
sns.lineplot(x=df.culmen_length_mm,y=df.culmen_depth_mm)
```

[22]: <Axes: xlabel='culmen_length_mm', ylabel='culmen_depth_mm'>



[23]:
```
sns.lineplot(x=df.flipper_length_mm,y=df.body_mass_g)
```

[23]: <Axes: xlabel='flipper_length_mm', ylabel='body_mass_g'>

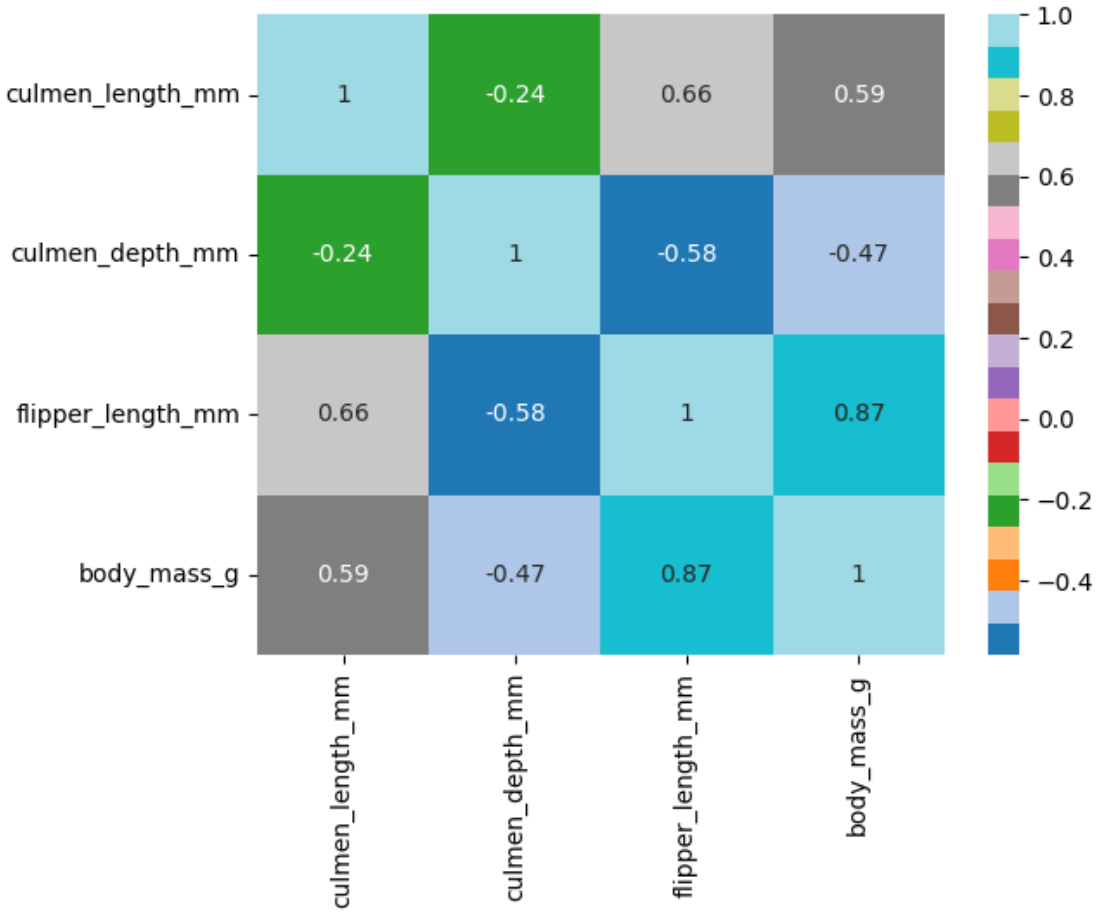


##Multivariate Analysis

[24]:
```
sns.heatmap(df.corr(),annot=True,cmap="tab20")
```

```
<ipython-input-24-dbf7c0edd73f>: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,cmap="tab20")
```

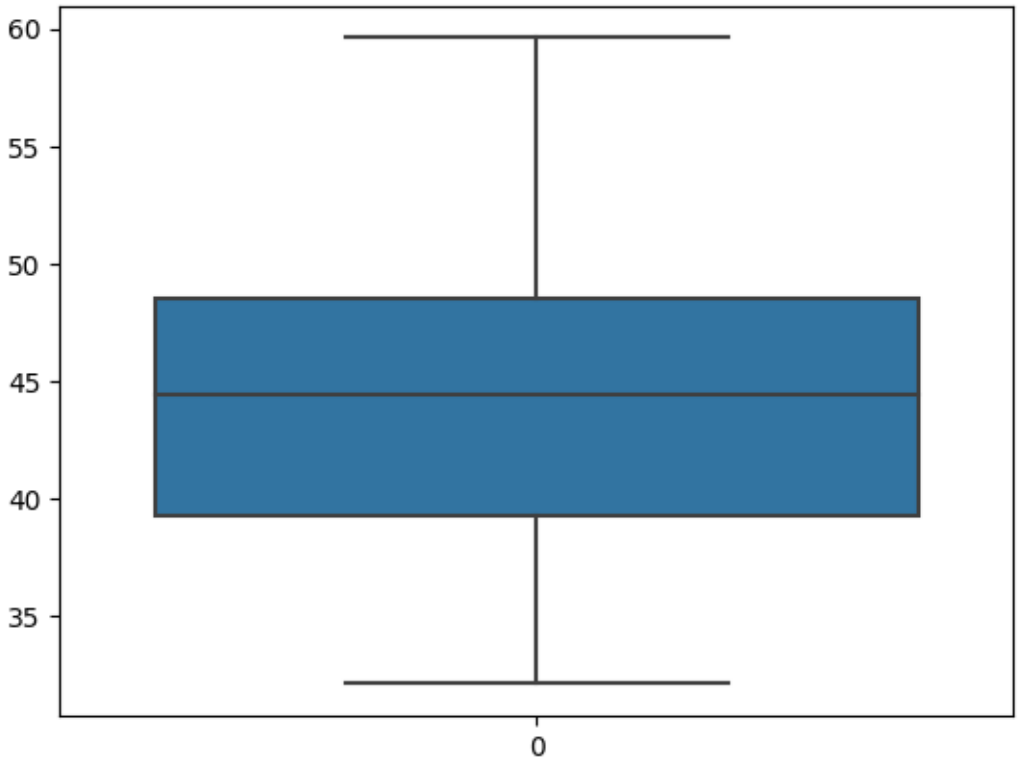
[24]: <Axes: >



##Outlier Detection

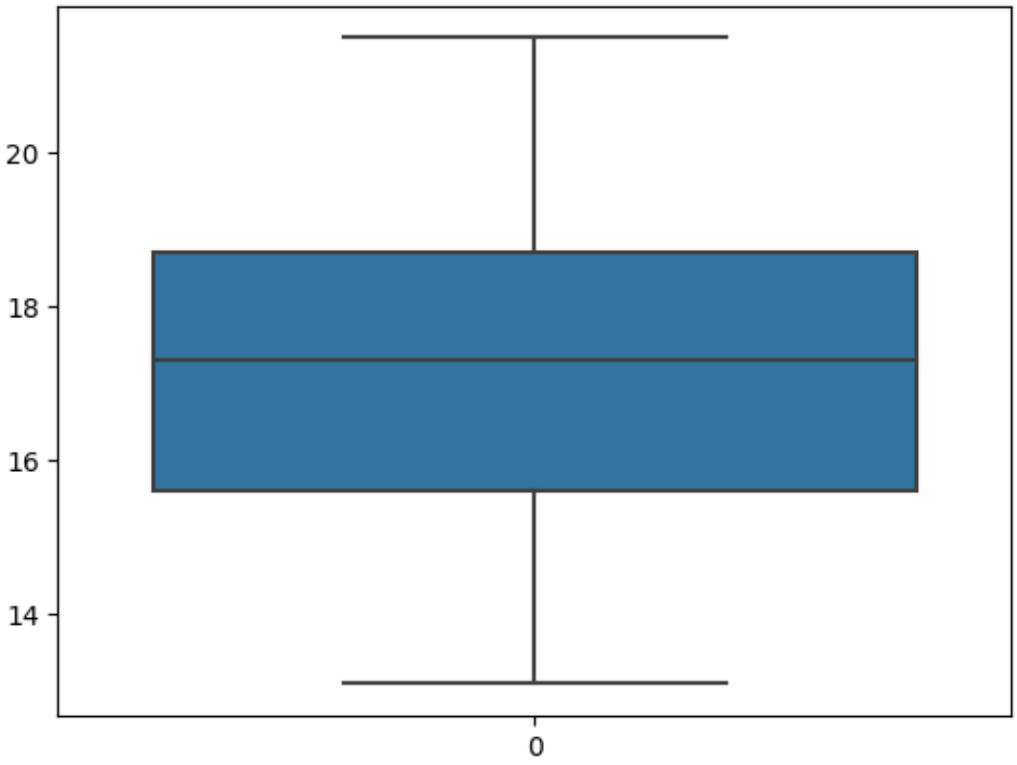
[25]:
```
sns.boxplot(df.culmen_length_mm)
```

[25]: <Axes: >



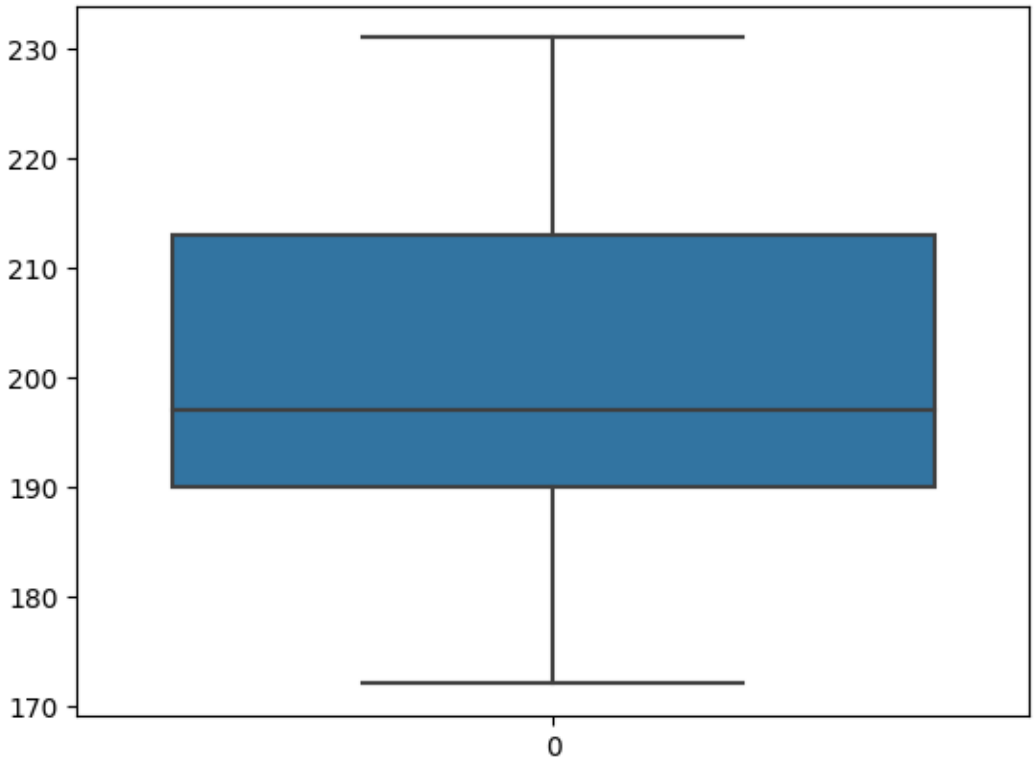
[26]:
```
sns.boxplot(df.culmen_depth_mm)
```

[26]: <Axes: >



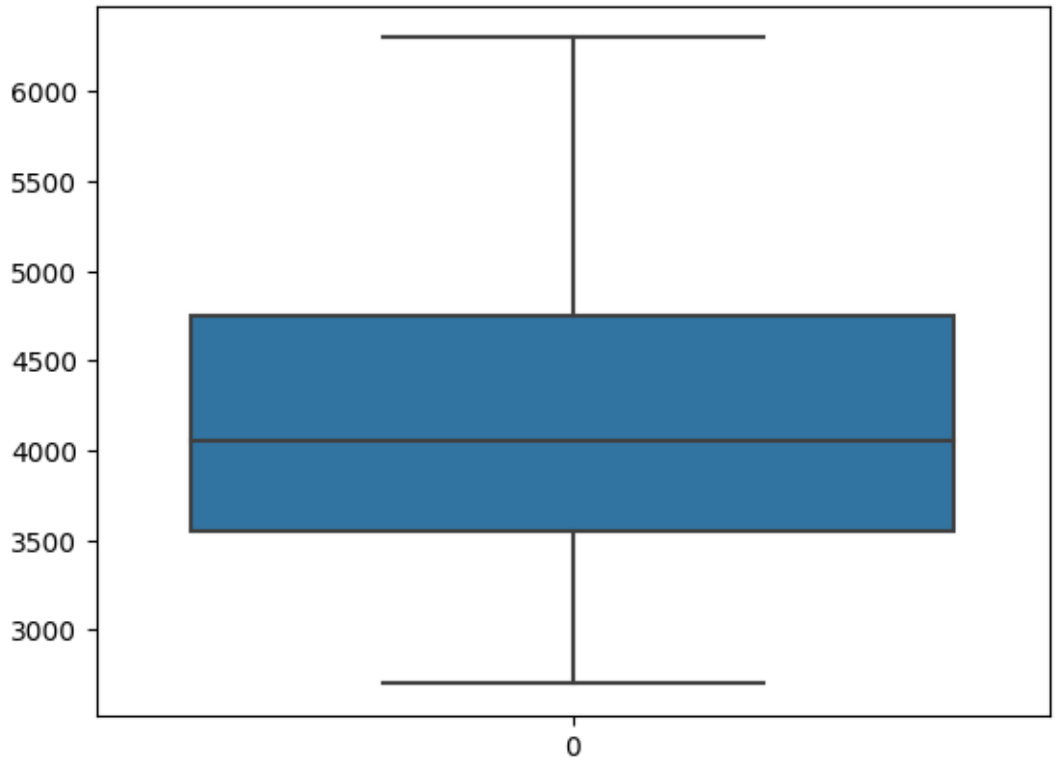
[27]:
```
sns.boxplot(df.flipper_length_mm)
```

[27]: <Axes: >



[28]:
```
sns.boxplot(df.body_mass_g)
```

[28]: <Axes: >



##Independent(x) and dependent(y) variable split

[29]:
```
x=df.iloc[:,1:]
x.head()
```

[29]:

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

##Performing Label Encoding for categorical columns

[30]:
```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
```

[31]:
```
x['island'] = le.fit_transform(df['island'])
x['sex'] = le.fit_transform(df['sex'])
```

[32]:
```
x.head()
```

[32]:
```
   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    1
1    0
2    0
3    1
4    0
```

[33]:
```
y = df.species
```

[34]:
```
y.head()
```

[34]:
```
0    Adelie
1    Adelie
2    Adelie
3    Adelie
4    Adelie
Name: species, dtype: object
```

##Scaling

[35]:
```
from sklearn.preprocessing import MinMaxScaler
scale = MinMaxScaler()
```

[36]:
```
x_scaled=pd.DataFrame(scale.fit_transform(x),columns=x.columns)
x_scaled.head()
```

[36]:
```
   island  culmen_length_mm  culmen_depth_mm  flipper_length_mm  body_mass_g  \
0     1.0          0.254545         0.666667           0.152542     0.291667
1     1.0          0.269091         0.511905           0.237288     0.305556
2     1.0          0.298182         0.583333           0.389831     0.152778
3     1.0          0.449091         0.500000           0.423729     0.375000
4     1.0          0.167273         0.738095           0.355932     0.208333

   sex
0  1.0
```

```
1  0.0
2  0.0
3  1.0
4  0.0
```

##Train Test Split

[37]:
```
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.
 ↪3,random_state=0)
```

##Train and Test data shape

[38]:
```
x_train.shape
```

[38]:
```
(240, 6)
```

[39]:
```
x_test.shape
```

[39]:
```
(104, 6)
```

[39]:
```

```