CSE3006 - Data Visualization

Lab Assignment 1

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Importing libraries

In [42]:
```
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
from pywaffle import Waffle
from statsmodels.graphics.mosaicplot import mosaic
import plotly.express as px
```

Import dataset

In [2]:
```
df = pd.read_csv("penguins_size.csv")
df.head()
```

Out[2]:

	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

In [3]:
```
df["island"].value_counts()
```

Out[3]:
```
island
Biscoe       168
Dream        124
Torgersen     52
Name: count, dtype: int64
```

In [4]:
```
df["sex"].value_counts()
```

Out[4]:
```
sex
MALE      168
FEMALE    165
.           1
Name: count, dtype: int64
```

Drop row with "." as sex

In [5]:
```
df = df.drop(df[df['sex'] == '.'].index)
```

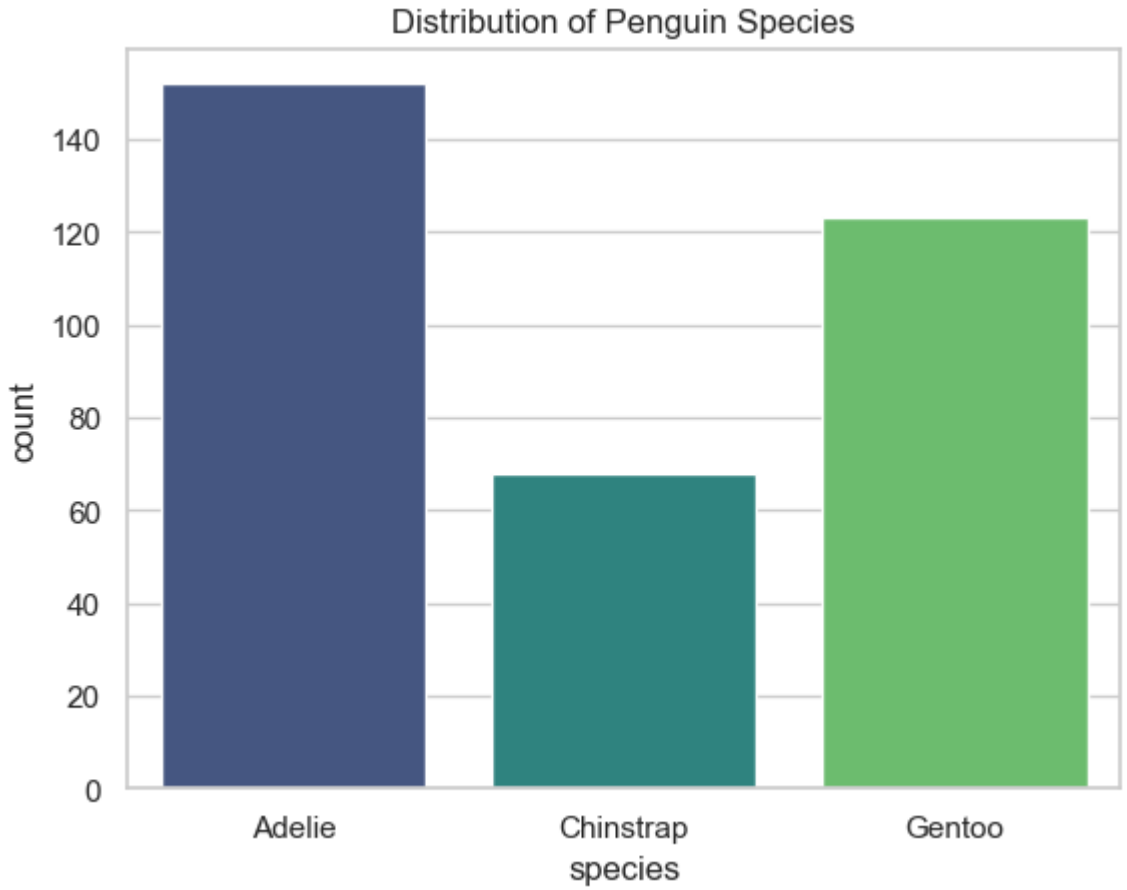
Set style for seaborn plots

In [6]:
```
sns.set(style='whitegrid')
```

Plots

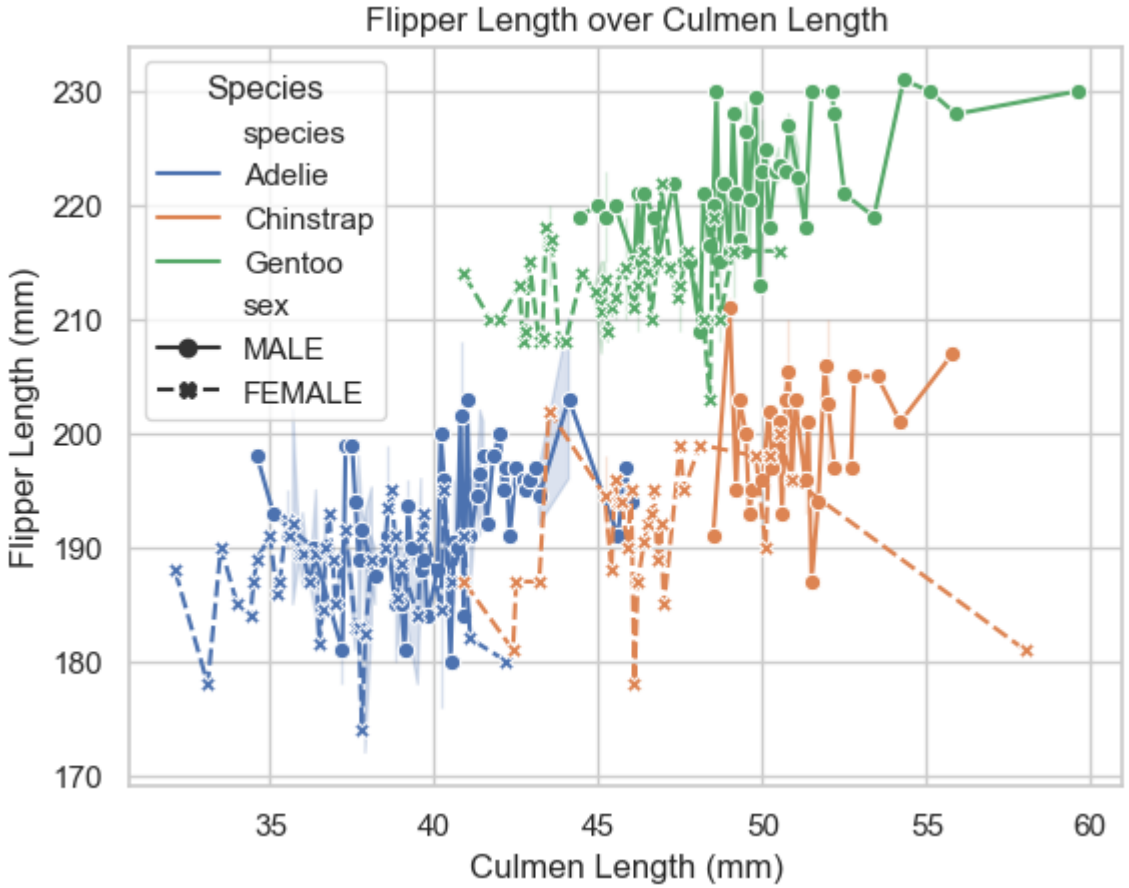
1. Bar Plot

In [7]:
```
sns.countplot(x='species', data=df, palette='viridis')
plt.title('Distribution of Penguin Species')
plt.show()
```



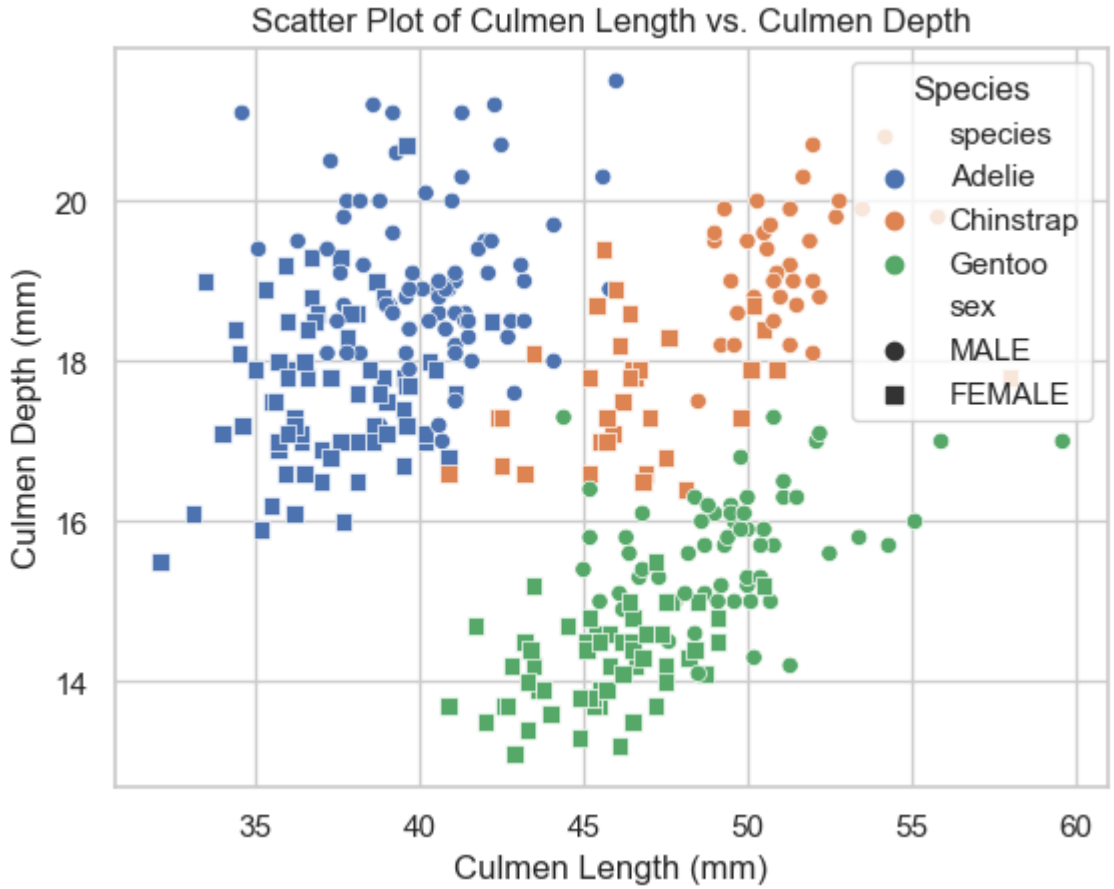
2. Line Plot

In [8]:
```
sns.lineplot(x='culmen_length_mm', y='flipper_length_mm', data=df, hue='species', style='sex', markers=True)
plt.title('Flipper Length over Culmen Length')
plt.xlabel('Culmen Length (mm)')
plt.ylabel('Flipper Length (mm)')
plt.legend(title='Species')
plt.show()
```



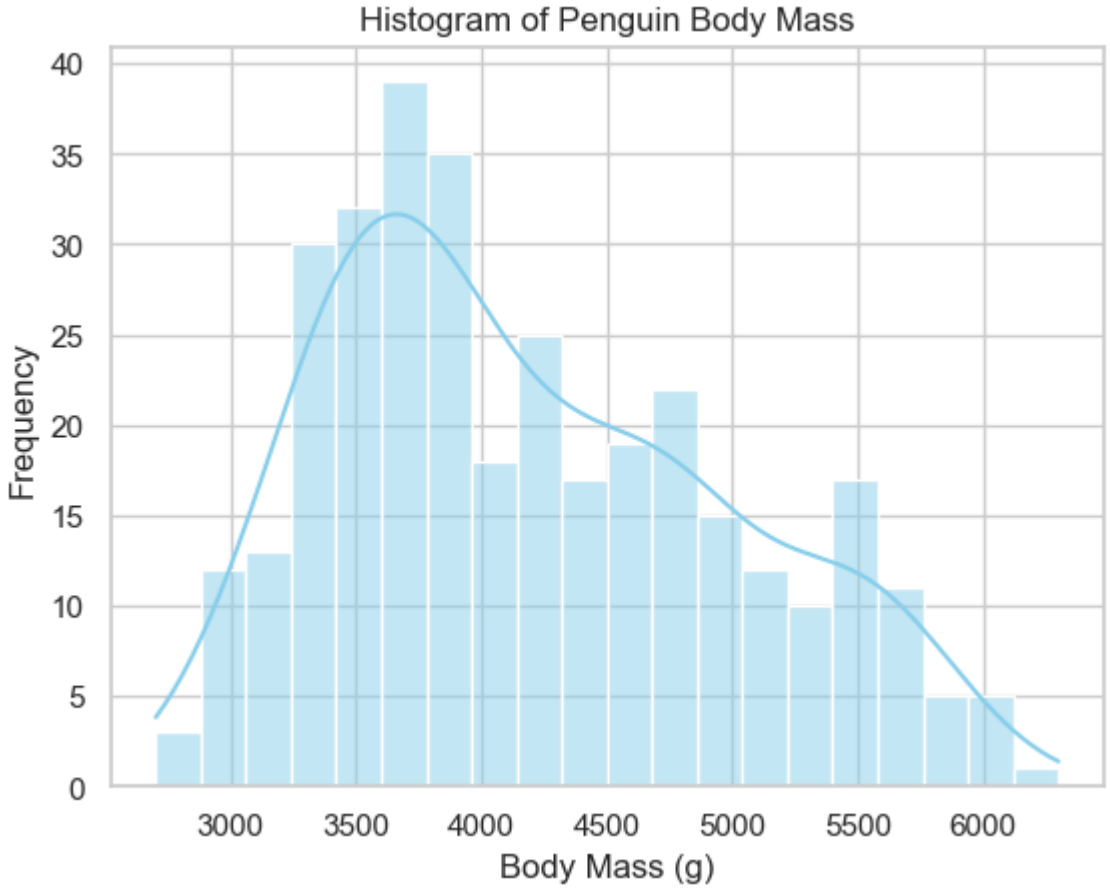
3. Scatter Plot

In [9]:
```
sns.scatterplot(x='culmen_length_mm', y='culmen_depth_mm', data=df, hue='species', style='sex', markers=['o',
plt.title('Scatter Plot of Culmen Length vs. Culmen Depth')
plt.xlabel('Culmen Length (mm)')
plt.ylabel('Culmen Depth (mm)')
plt.legend(title='Species')
plt.show()
```



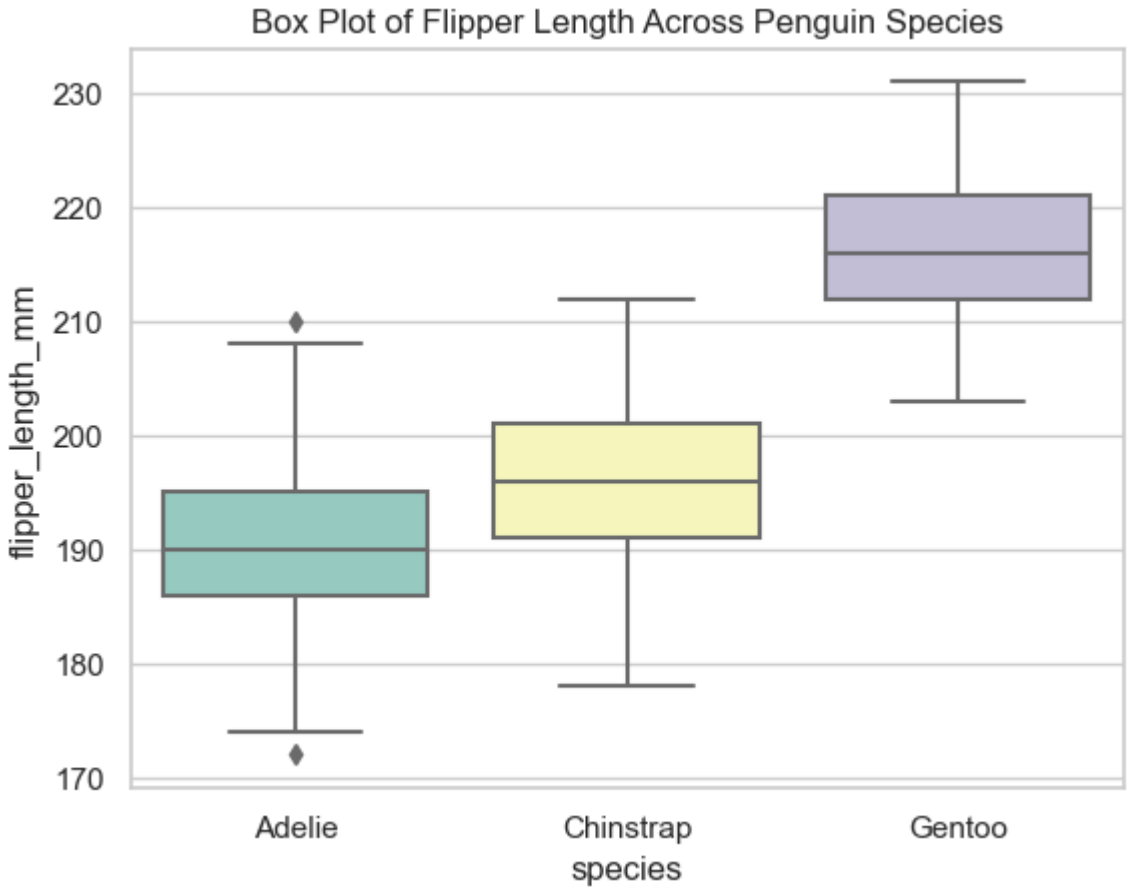
4. Histogram

In [10]:
```
sns.histplot(df['body_mass_g'], bins=20, kde=True, color='skyblue')
plt.title('Histogram of Penguin Body Mass')
plt.xlabel('Body Mass (g)')
plt.ylabel('Frequency')
plt.show()
```



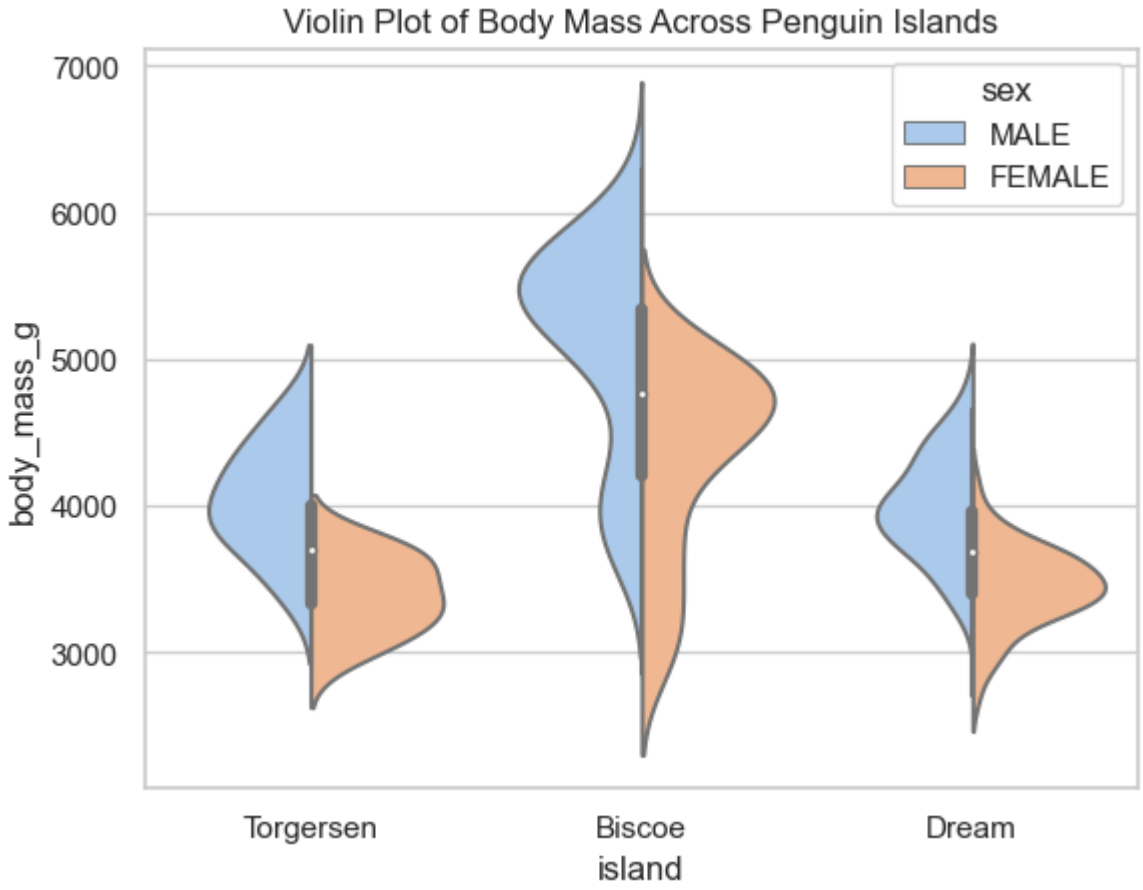
5. Box Plot

In [11]:
```
sns.boxplot(x='species', y='flipper_length_mm', data=df, palette='Set3')
plt.title('Box Plot of Flipper Length Across Penguin Species')
plt.show()
```



6. Violin Plot

In [12]:
```
sns.violinplot(x='island', y='body_mass_g', data=df, hue='sex', split=True, palette='pastel')
plt.title('Violin Plot of Body Mass Across Penguin Islands')
plt.show()
```

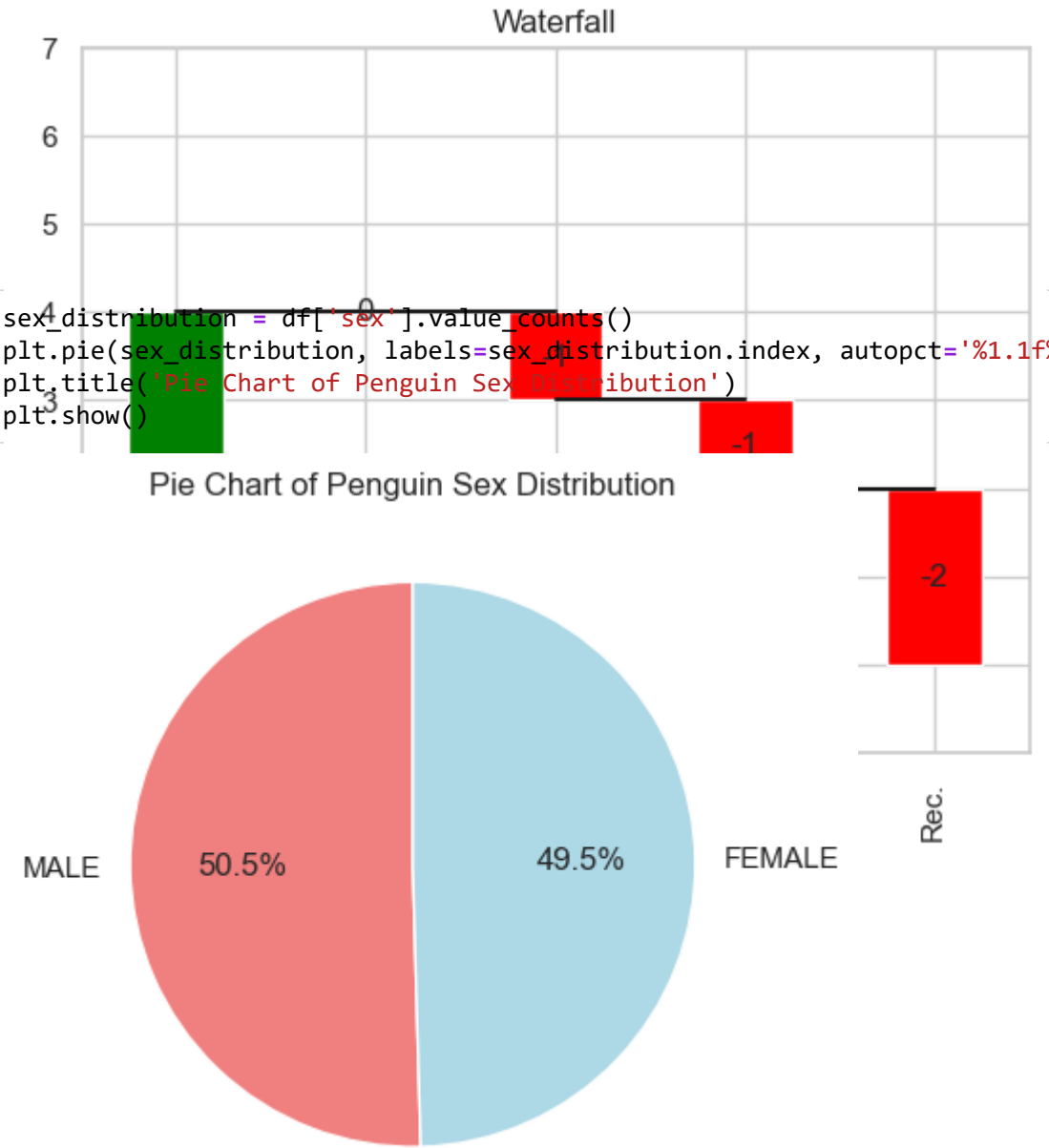


7. Waterfall Chart

In [13]:
```
df2 = pd.DataFrame({'orders':[4, 0, -1, -1, -2],
                    'names':['Total', 'Wachting', 'Stopped', 'Development', 'Rec.']})
colors = df2.orders.apply(lambda x: 'green' if x>0 else 'red')
bottom = df2.orders.cumsum().shift(1).fillna(0)
gap = bottom.reset_index(drop=True).repeat(3).shift(-1)
gap[1::3] = np.nan

fig, ax = plt.subplots()
my_plot = df2.plot.bar(x='names', y='orders', legend=None, bottom=bottom,title="Waterfall", color=colors, ax=
my_plot.plot(gap.index, gap.values,'k')

my_plot.bar_label(ax.containers[0], label_type='center')
my_plot.set_ylim(-1,7)
```

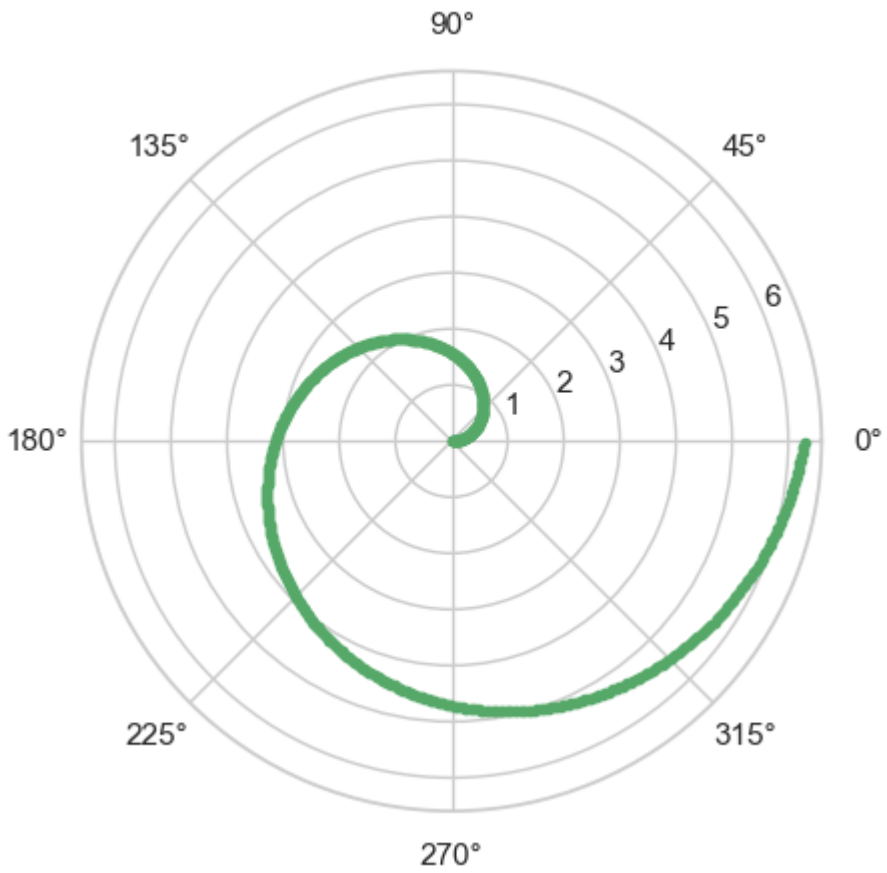
Out[13]:
```
(-1.0, 7.0)
```

In [14]:
```
sex_distribution = df['sex'].value_counts()
plt.pie(sex_distribution, labels=sex_distribution.index, autopct='%1.1f%%', startangle=90, colors=['lightcora
plt.title('Pie Chart of Penguin Sex Distribution')
plt.show()
```



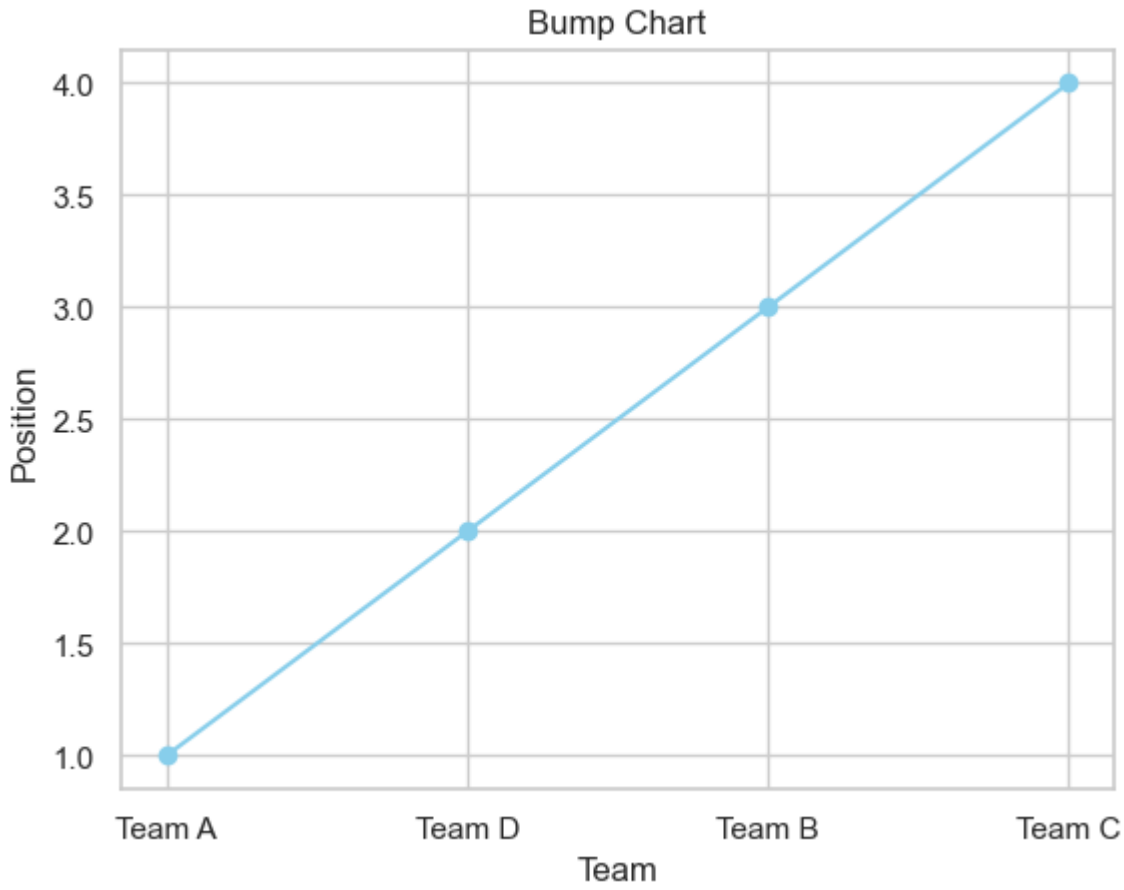
9. Polar Chart

In [19]:
```
plt.axes(projection = 'polar')
rads = np.arange(0, 2 * np.pi, 0.01)

for rad in rads:
    r = rad
    plt.polar(rad, r, 'g.')

plt.show()
```



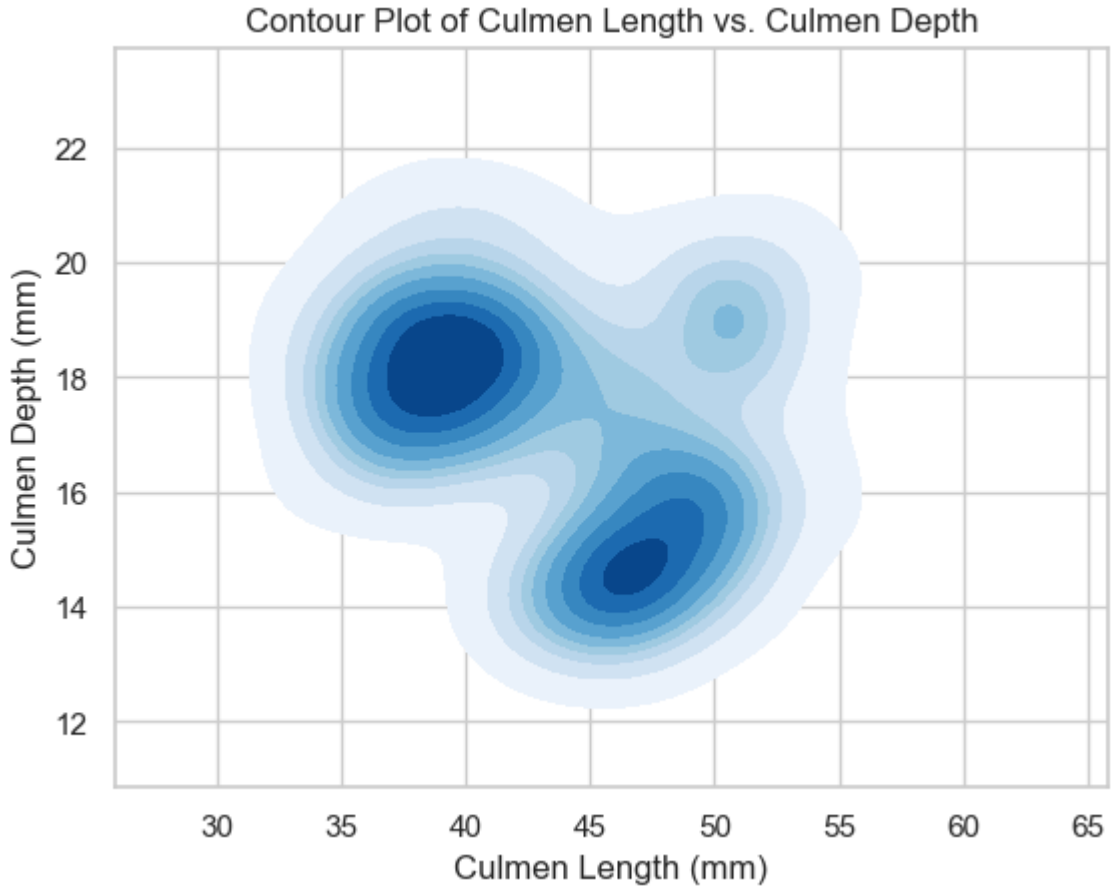
10. Bump Chart

In [16]:
```
data = {
    'Team': ['Team A', 'Team B', 'Team C', 'Team D'],
    'Position': [1, 3, 4, 2]
}

df_bump = pd.DataFrame(data)
df_bump = df_bump.sort_values(by='Position')

plt.plot(df_bump['Team'], df_bump['Position'], marker='o', linestyle='-', color='skyblue')
plt.title('Bump Chart')
plt.xlabel('Team')
plt.ylabel('Position')
plt.show()
```



11. Contour Plot

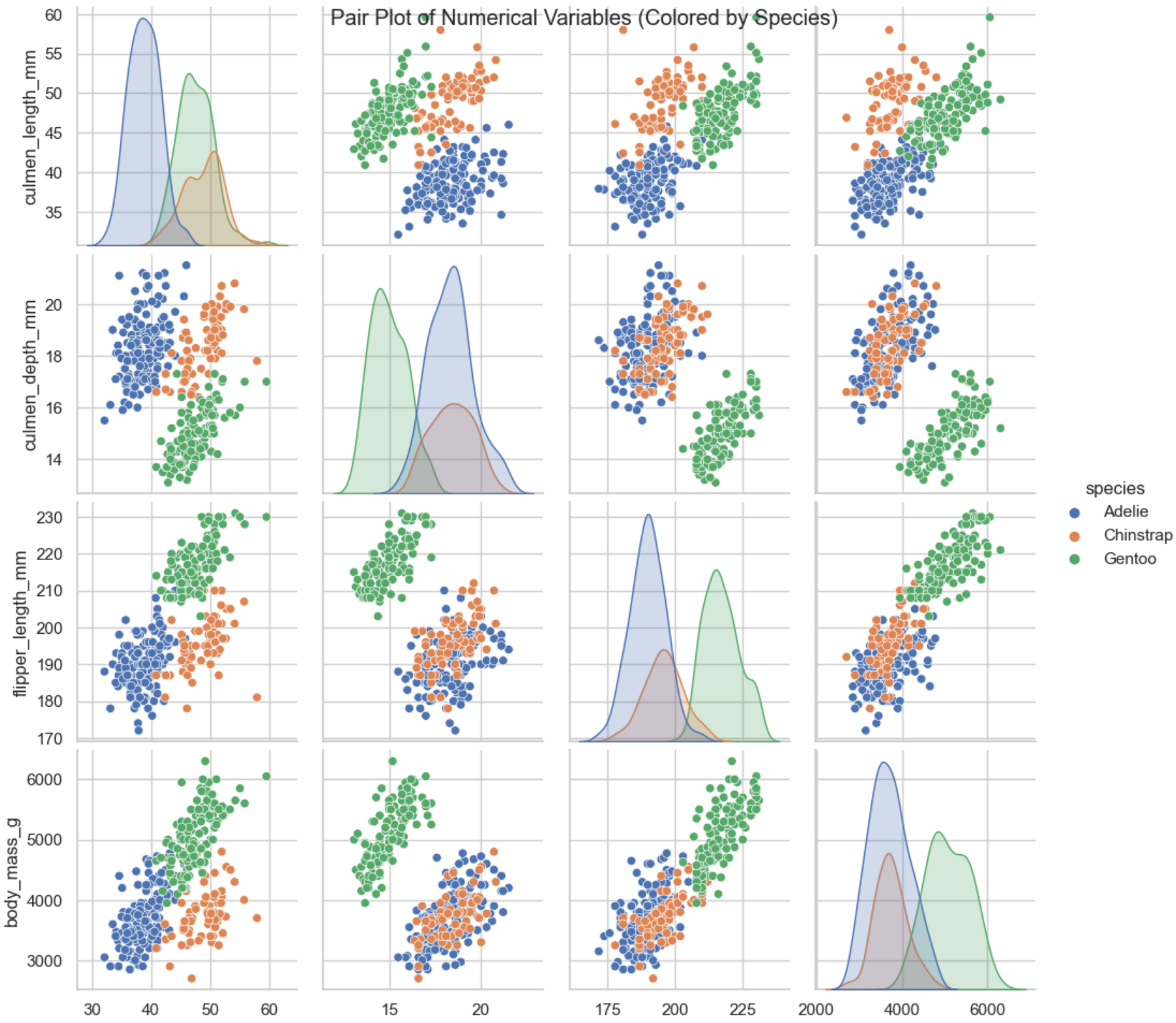
In [20]:
```
sns.kdeplot(data=df, x='culmen_length_mm', y='culmen_depth_mm', fill=True, cmap='Blues')
plt.title('Contour Plot of Culmen Length vs. Culmen Depth')
plt.xlabel('Culmen Length (mm)')
plt.ylabel('Culmen Depth (mm)')
plt.show()
```



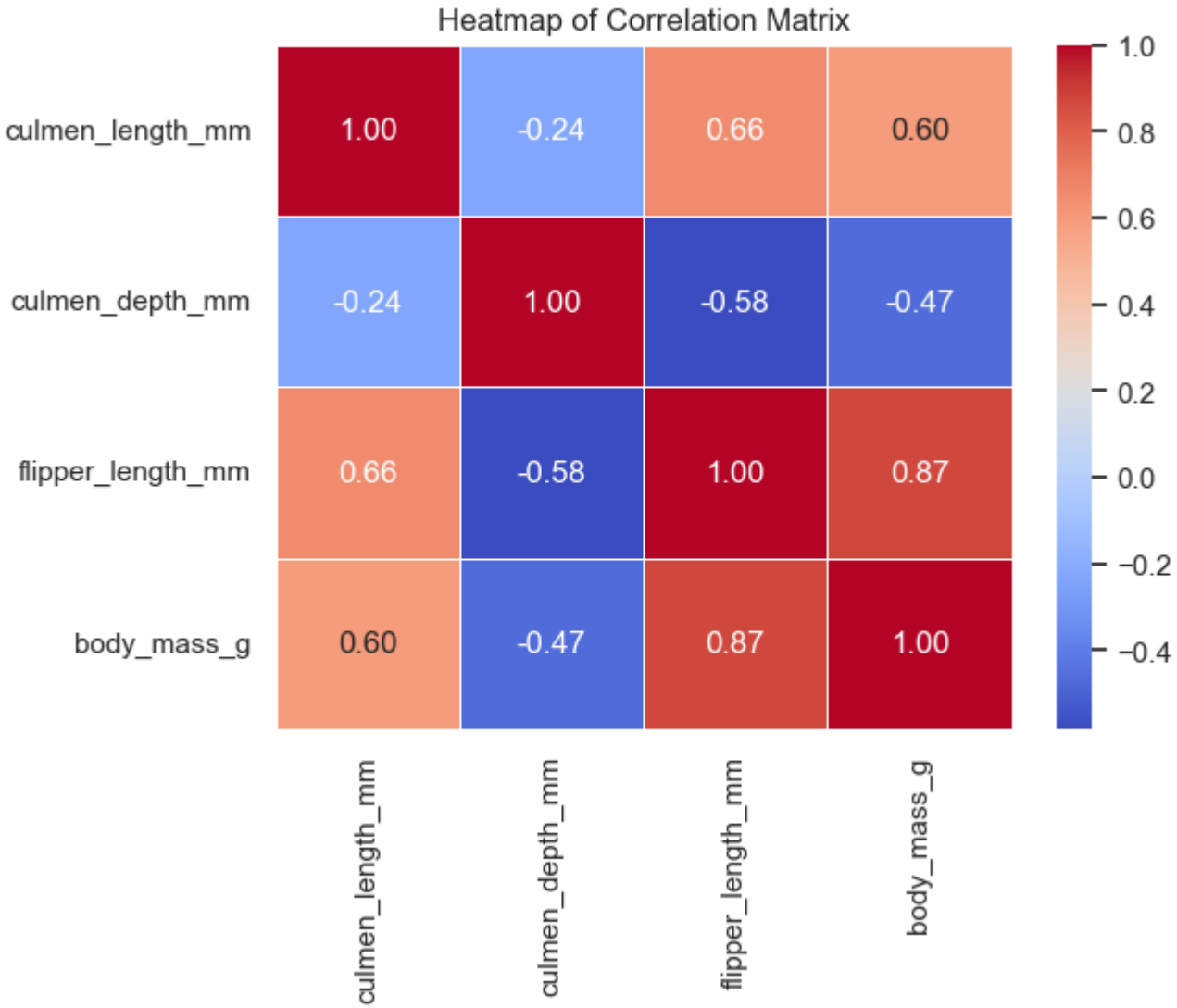
12. Correlogram

In [23]:
```
sns.pairplot(df, hue='species', diag_kind='kde')
plt.suptitle('Pair Plot of Numerical Variables (Colored by Species)')
plt.show()
```

```
C:\Users\jaiga\anaconda3\Lib\site-packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has chang
ed to tight
  self._figure.tight_layout(*args, **kwargs)
```

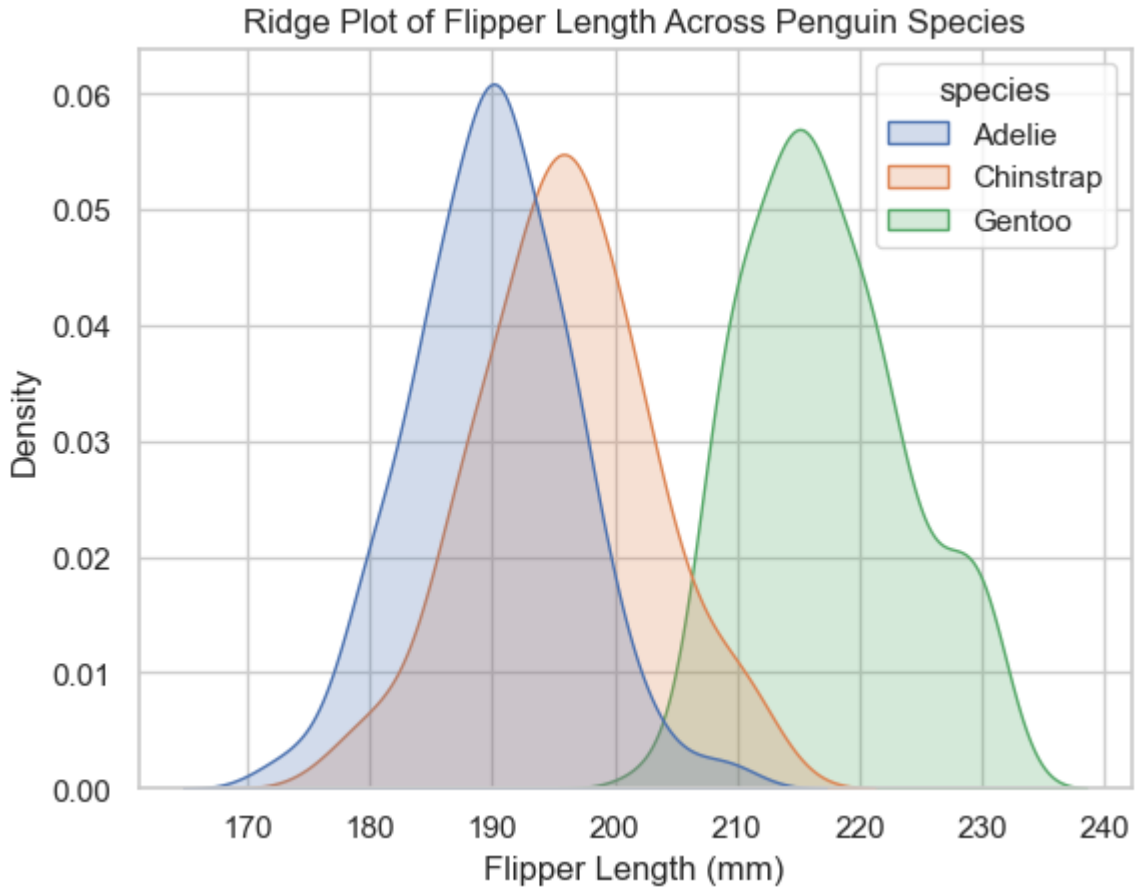

Pair Plot of Numerical Variables (Colored by Species)
culmen_length_mm
culmen_depth_mm
flipper_length_mm
body_mass_g
species
Adelie
Chinstrap
Gentoo

In [24]:
```
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt='.2f', linewidths=0.5)
plt.title('Heatmap of Correlation Matrix')
plt.show()
```



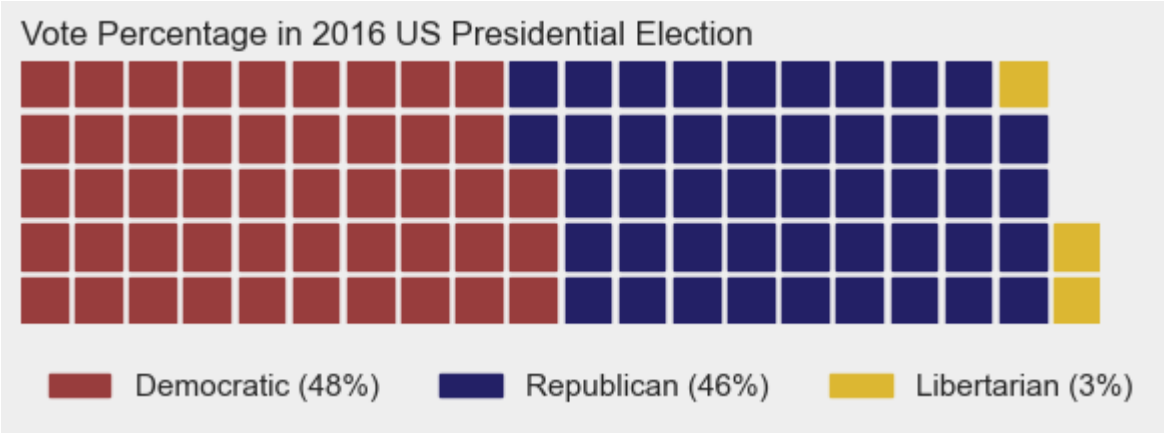
14. Ridge Plot

In [25]:
```
sns.kdeplot(data=df, x='flipper_length_mm', hue='species', fill=True, common_norm=False)
plt.title('Ridge Plot of Flipper Length Across Penguin Species')
plt.xlabel('Flipper Length (mm)')
plt.show()
```



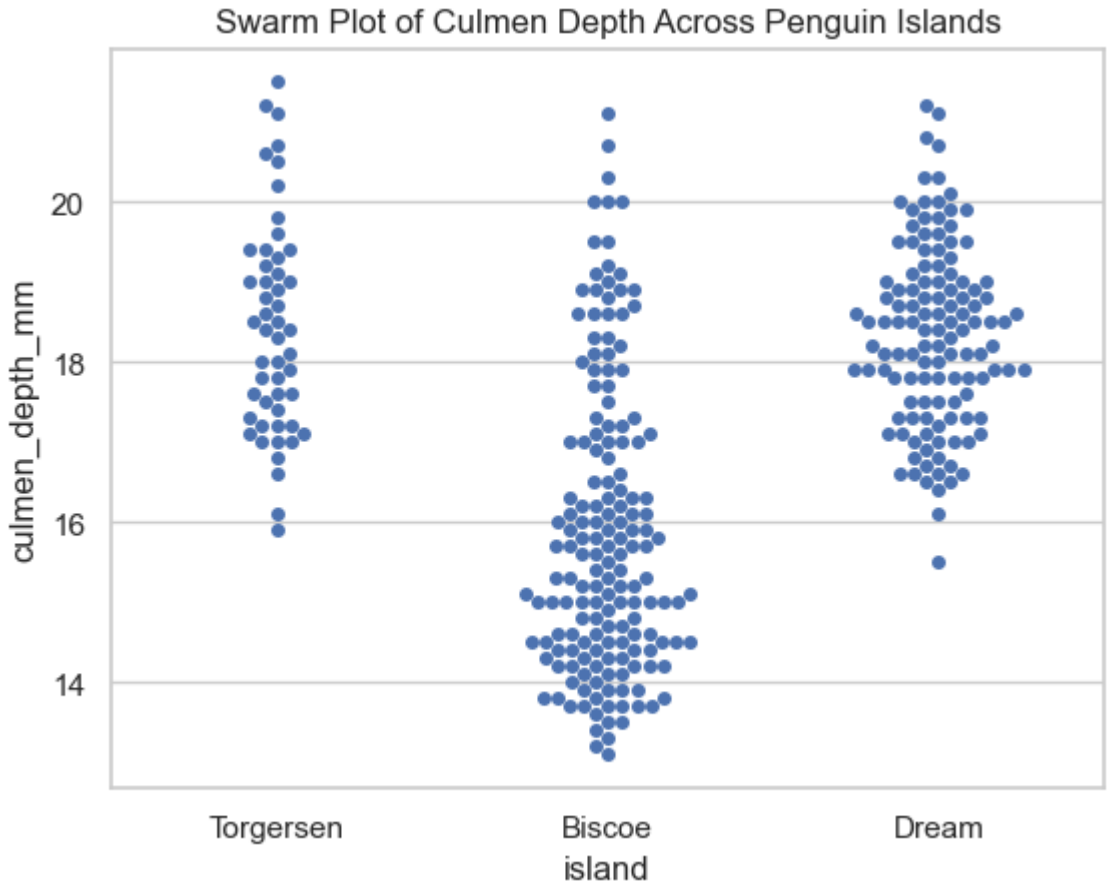
15. Waffle Plot

In [29]:
```
data = {'Democratic': 48, 'Republican': 46, 'Libertarian': 3}
fig = plt.figure(
    FigureClass=Waffle,
    rows=5,
    values=data,
    colors=("#983D3D", "#232066", "#DCB732"),
    title={'label': 'Vote Percentage in 2016 US Presidential Election', 'loc': 'left'},
    labels=["{0} ({1}%)".format(k, v) for k, v in data.items()],
    legend={'loc': 'lower left', 'bbox_to_anchor': (0, -0.4), 'ncol': len(data), 'framealpha': 0}
)
fig.gca().set_facecolor('#EEEEEE')
fig.set_facecolor('#EEEEEE')
plt.show()
```



16. Swarm Plot

In [30]:
```
sns.swarmplot(x='island', y='culmen_depth_mm', data=df)
plt.title('Swarm Plot of Culmen Depth Across Penguin Islands')
plt.show()
```



17. Mosaic Plot

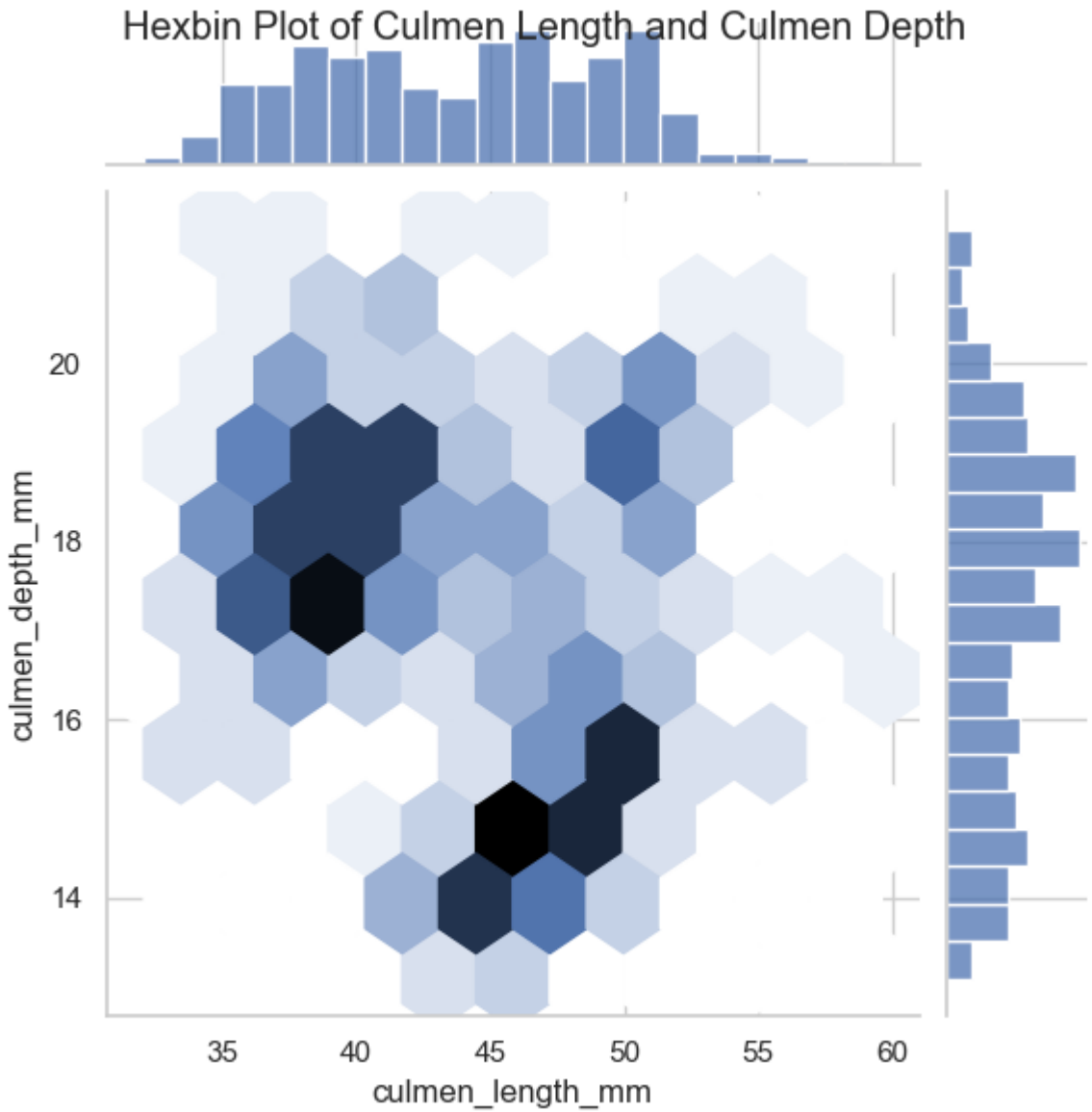
In [39]:
```
data = {
    ('Male', 'A'): 30,
    ('Male', 'B'): 20,
    ('Female', 'A'): 25,
    ('Female', 'B'): 35,
}

mosaic(data, title='Mosaic Plot', labelizer=lambda k: '')

plt.show()
```

18. Hierarchical Plot

In [43]:
```
data = {
    'Category1': ['A', 'B', 'C', 'D'],
    'Category2': ['X', 'Y', 'Z', 'W'],
    'Value': [10, 15, 20, 25]
}

df_hierarchy = pd.DataFrame(data)

fig = px.sunburst(df_hierarchy, path=['Category1', 'Category2'], values='Value')
fig.update_layout(title='Hierarchical Plot')
fig.show()
```

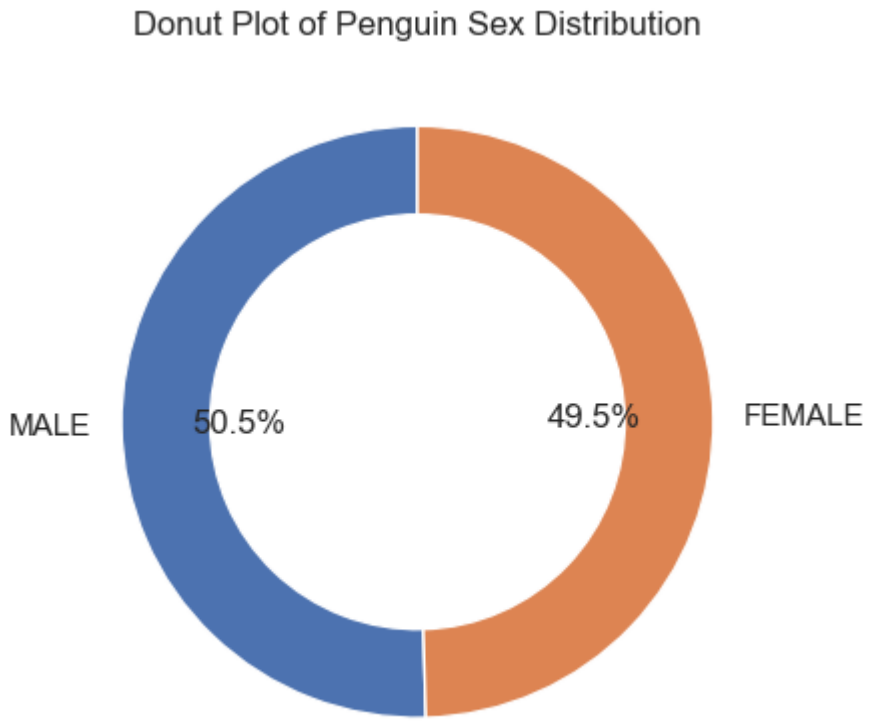
19. Hexbin Plot

In [44]:
```
sns.jointplot(x='culmen_length_mm', y='culmen_depth_mm', data=df, kind='hex', marginal_kws=dict(bins=20))
plt.suptitle('Hexbin Plot of Culmen Length and Culmen Depth')
plt.show()
```



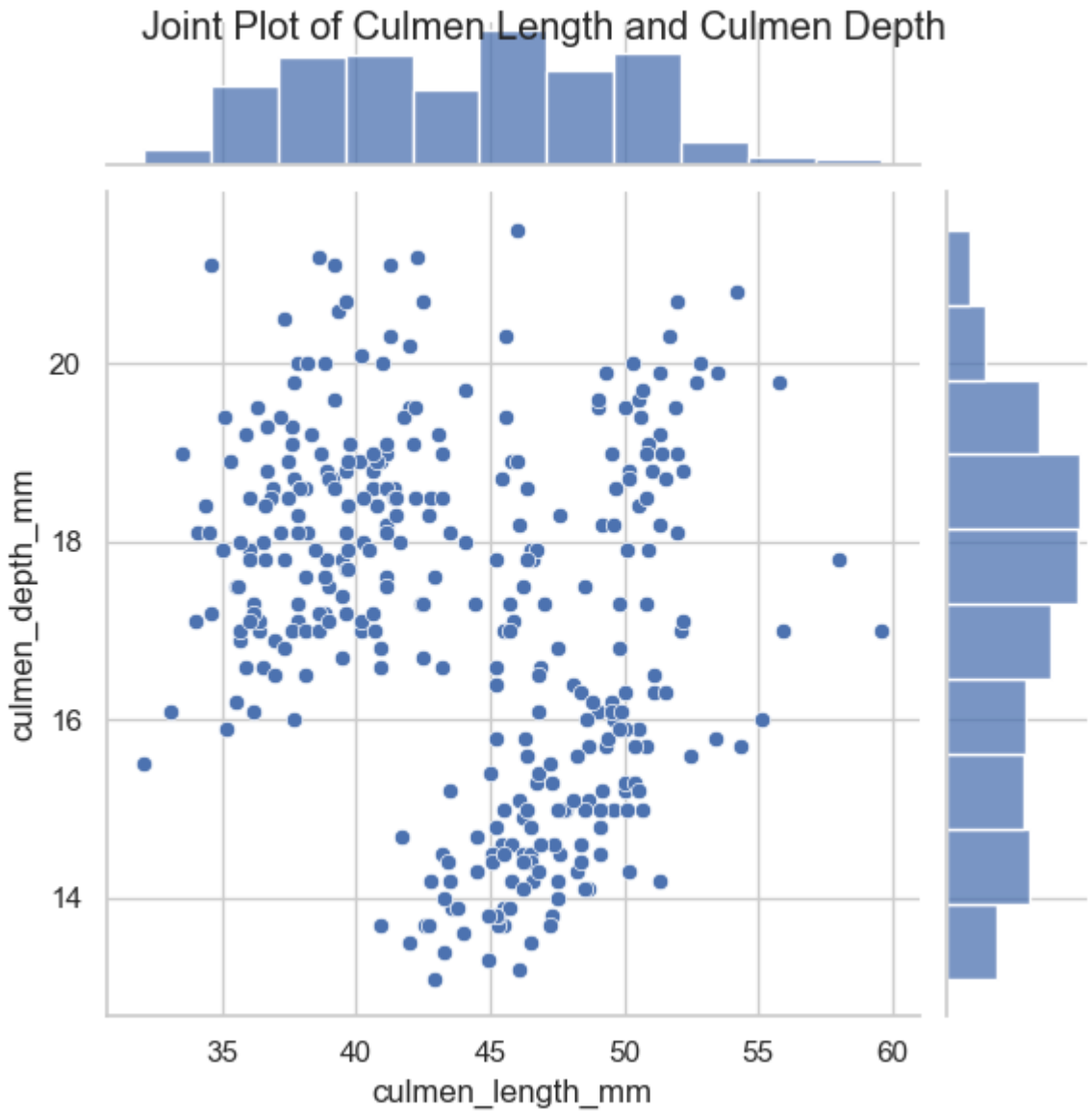
20. Donut Plot

In [45]:
```
sex_distribution = df['sex'].value_counts()
plt.pie(sex_distribution, labels=sex_distribution.index, autopct='%1.1f%%', startangle=90, wedgeprops=dict(wi
plt.gca().add_artist(plt.Circle((0, 0), 0.2, color='white'))
plt.title('Donut Plot of Penguin Sex Distribution')
plt.show()
```



21. Joint Plot

In [46]:
```
sns.jointplot(x='culmen_length_mm', y='culmen_depth_mm', data=df, kind='scatter')
plt.suptitle('Joint Plot of Culmen Length and Culmen Depth')
plt.show()
```

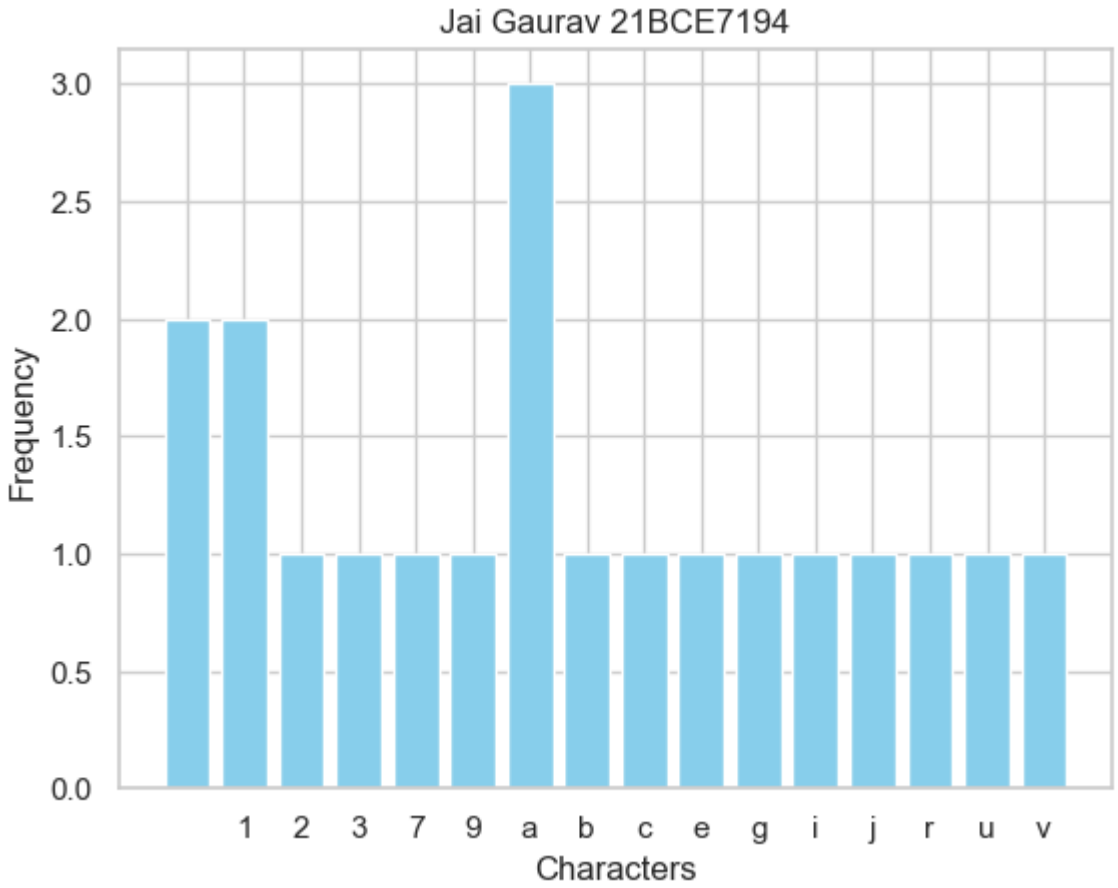


Histogram Function

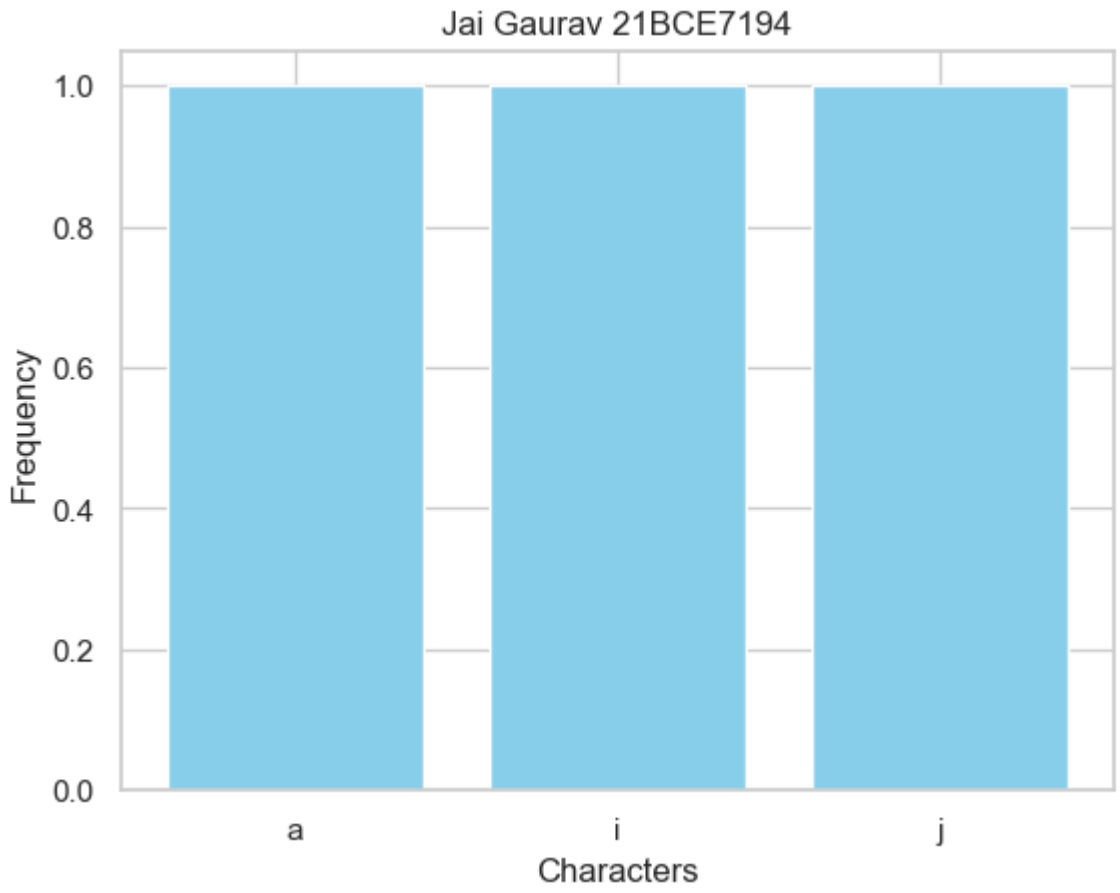
Generate histogram for character count in your name

In [47]:
```
def gen_hist(word: str):
    character_count = {}
    for character in word.lower():
        character_count[character] = character_count.get(character, 0) + 1

    characters, counts = zip(*sorted(character_count.items()))

    plt.bar(characters, counts, color='skyblue')
    plt.xlabel('Characters')
    plt.ylabel('Frequency')
    plt.title('Jai Gaurav 21BCE7194')
    plt.show()
```

In [48]:
```
# word = input("Enter a word: ")
word = "Jai Gaurav 21BCE7193"
gen_hist(word)
```



In [49]:
```
gen_hist("Jai")
```



In [ ]:
```

```