Lab09

CPSC 4800

Exercise 1

For this exercise, we are going to load the iris dataset via seaborn:

In [1]:

```
import seaborn as sns; sns.set(style="ticks", color_codes=True)
iris = sns.load_dataset("iris")
```

In [2]:

```
# head of the data
iris.head()
```

Out[2]:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

Using the iris dataset, answer the following questions using seaborn:

- Learn about the dataset here (https://www.kaggle.com/arshid/iris-flower-dataset)
- Get the summary statistics of the data
- Draw scatterplots for joint relationships and histograms for univariate distributions
- Add another dimension ("species") to the pairplot
- Use a different color palette in your pairplot (hint: add this paramater to your code: `palette="husl"`)
- Use different markers for each level of the hue variable ((hint: add this paramater to your code: `markers=["o", "s", "D"]`), all possible markers are defined here: https://matplotlib.org/3.1.0/api/markers_api.html
- Show pairplot only for few variables ["sepal_width", "sepal_length"]: (hint: use `vars` argument)
- Plot only the lower triangle of bivariate axes (hint: use `corner = True`)

In [3]:

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
```

In [6]:

```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   sepal_length  150 non-null    float64
 1   sepal_width   150 non-null    float64
 2   petal_length  150 non-null    float64
 3   petal_width   150 non-null    float64
 4   species       150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

In [8]:

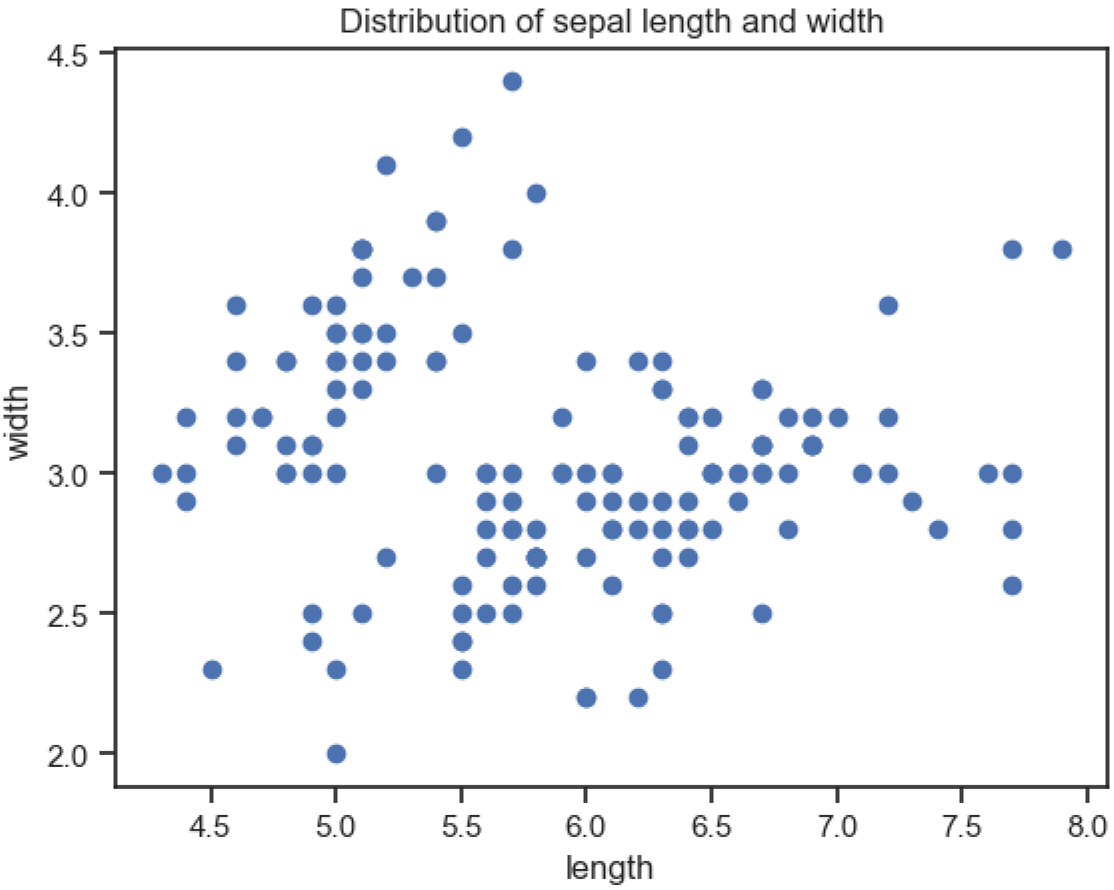
```
#Summary of statistic data
iris.describe()
```

Out[8]:

	sepal_length	sepal_width	petal_length	petal_width
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.057333	3.758000	1.199333
std	0.828066	0.435866	1.765298	0.762238
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000
75%	6.400000	3.300000	5.100000	1.800000
max	7.900000	4.400000	6.900000	2.500000

In [10]:

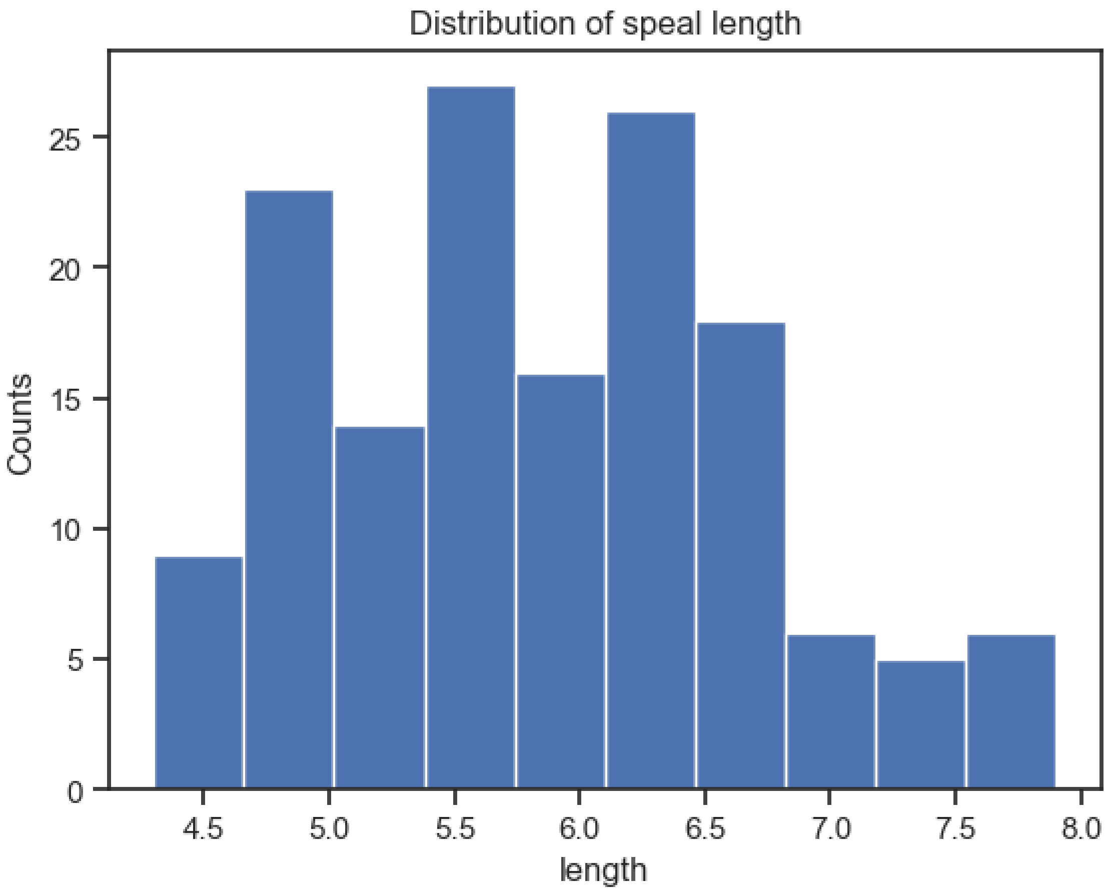
```
# Draw scatter plot for
x= np.array(iris['sepal_length'])
y = np.array(iris['sepal_width'])
plt.scatter(x, y)
plt.xlabel('length')
plt.ylabel('width')
plt.title('Distribution of sepal length and width')
plt.show()
```



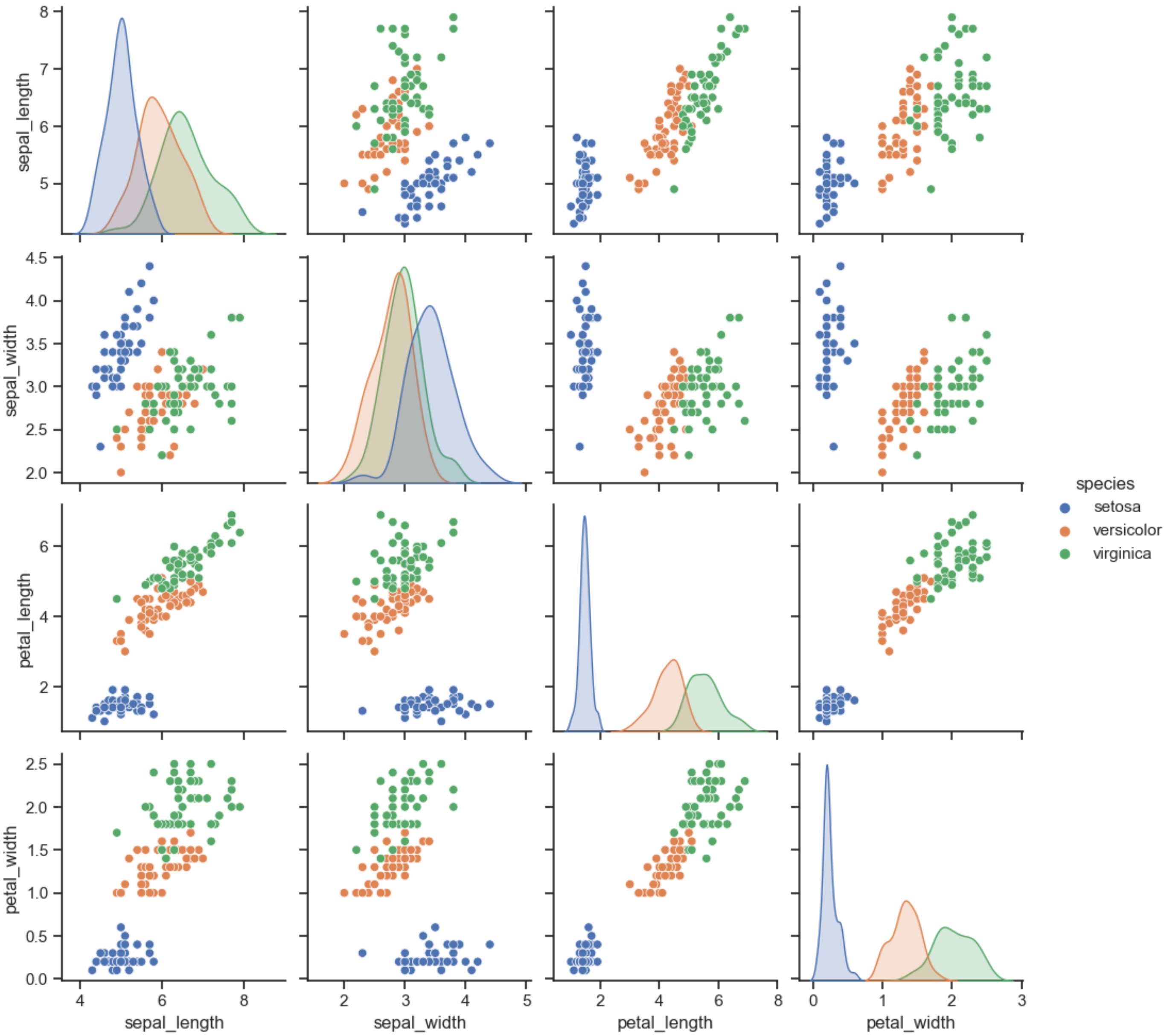
In [13]:

```
# Histogram of sepal length
```

```
plt.hist(iris['sepal_length'])
plt.title('Distribution of speal length')
plt.xlabel('length')
plt.ylabel('Counts')
plt.show()
```

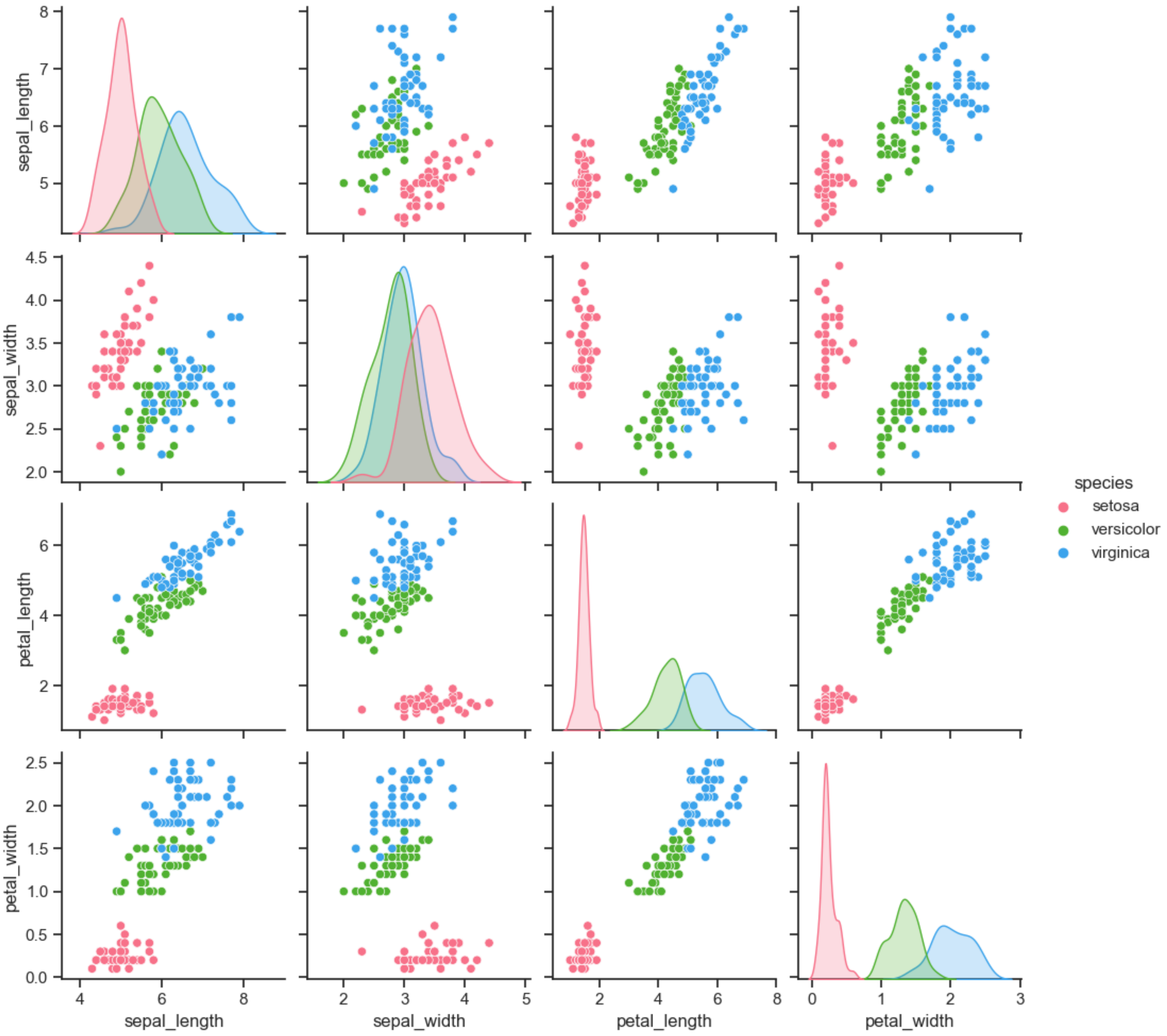


In [20]:
```
# Add another dimension ("species") to the pairplot
sns.pairplot(iris, hue='species')
plt.show()
```



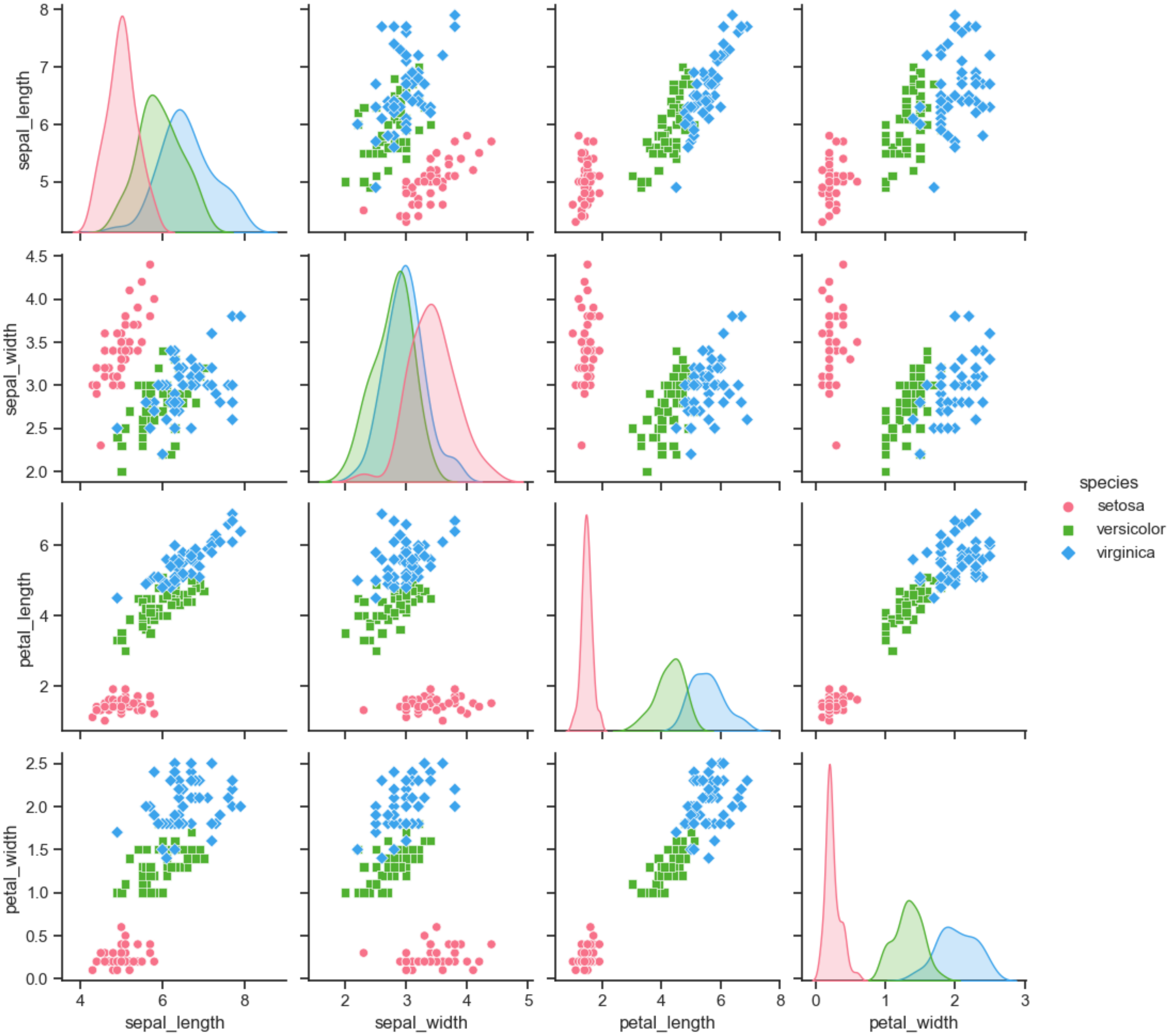
In [18]:

```
# Add pallete
sns.pairplot(iris, hue='species', palette ='husl') #palette="husl" #dark
plt.show()
```



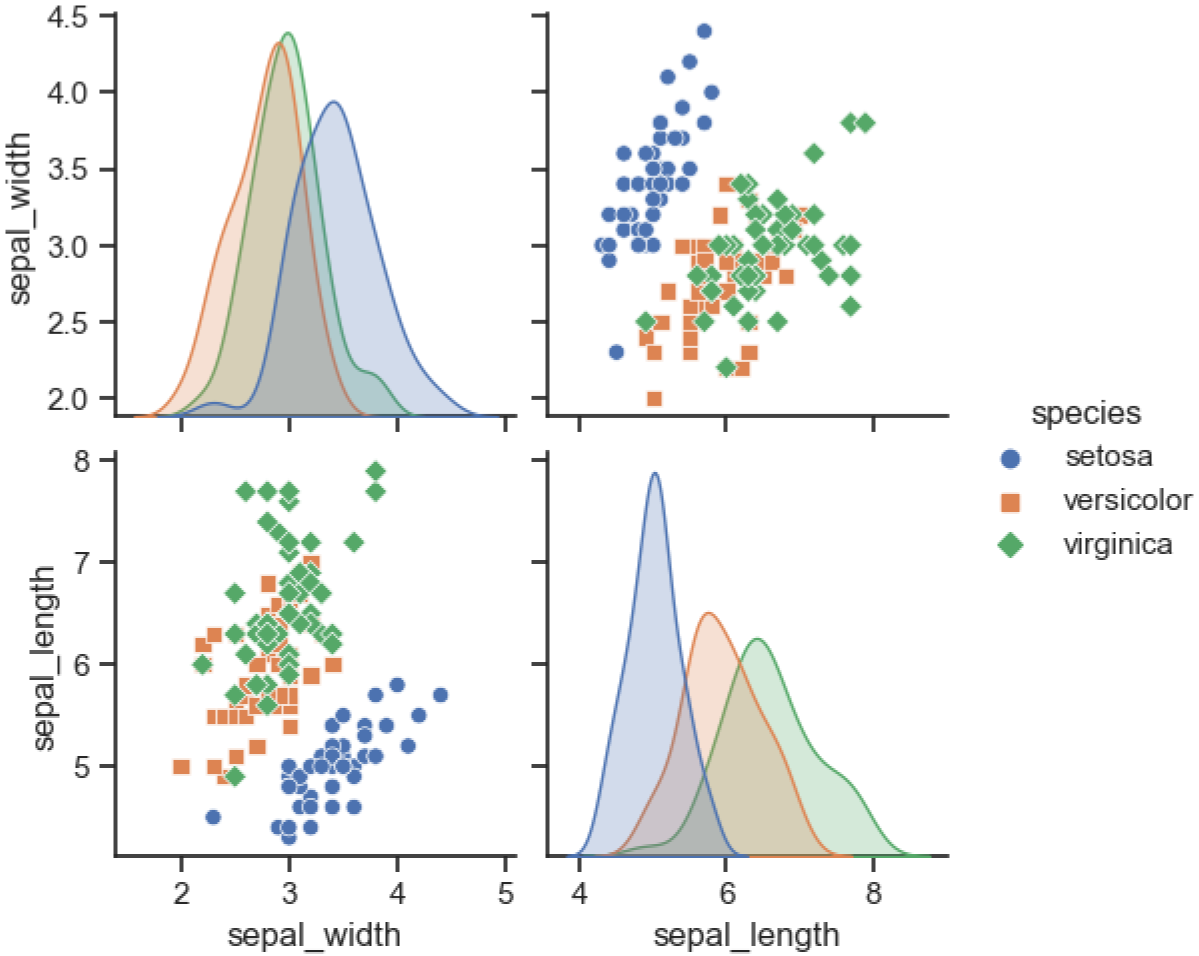
In [19]:

```
# Add markers
sns.pairplot(iris, hue='species', palette ='husl', markers=["o", "s", "D"])
plt.show()
```



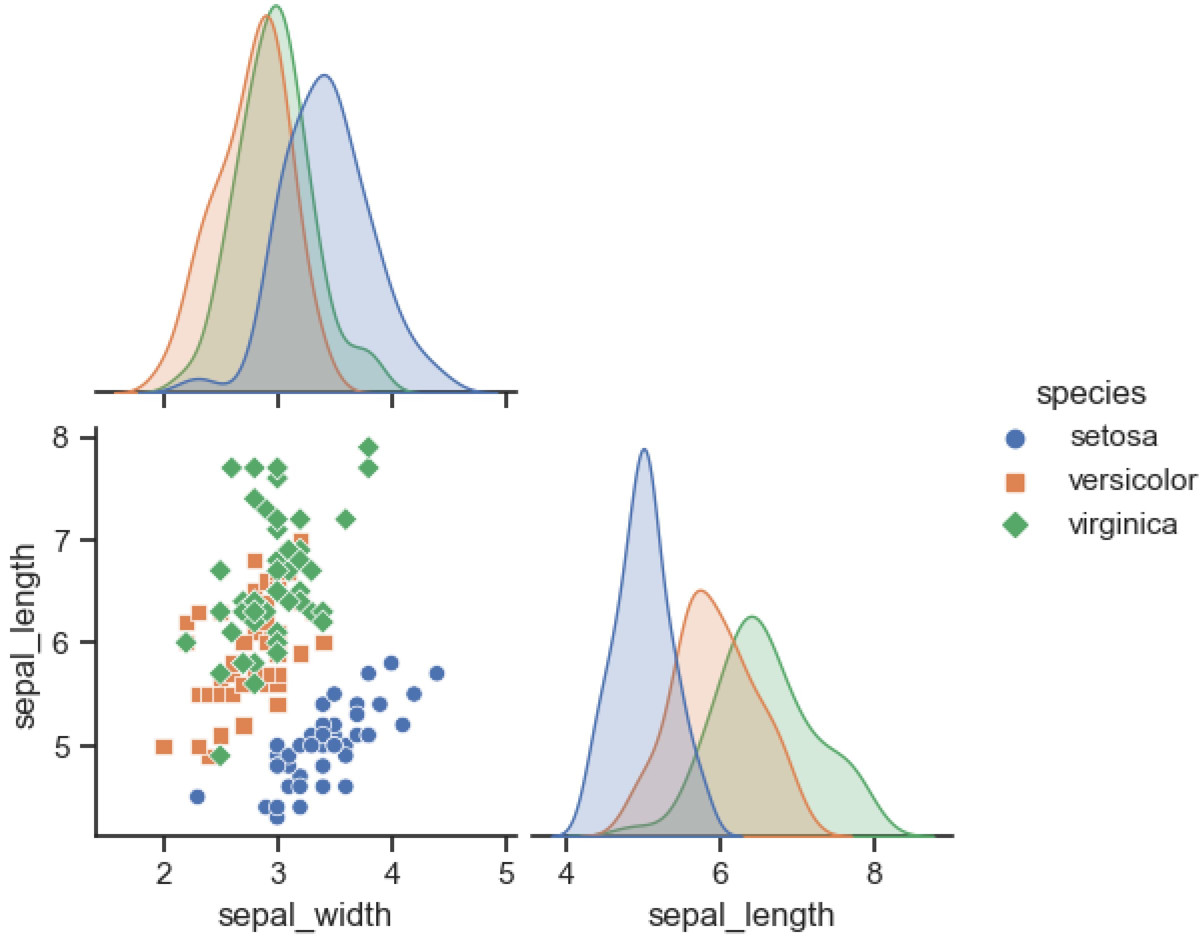
In [21]:

```
# Select specific variables
sns.pairplot(iris, vars = ["sepal_width", "sepal_length"], hue='species', markers=["o",
plt.show()
```



In [22]:

```
# Plot only the lower triangle of bivariate axes
sns.pairplot(iris, vars = ["sepal_width", "sepal_length"], markers=["o", "s", "D"], corn
plt.show()
```



Exercise 2

This exercise is aimed toward data analysis of flight delay for NYC in 2013. Pleaes download the flight_data.csv from the lab folder. This file contains dataset information about all flights that departed from NYC (e.g. EWR, JFK and LGA) in 2013: 336,776 flights in total.

Github

Please create a **private** github repo and submit your answers on the **private github**. Please add me as collaborator to your github account: `nasimtaba` to review your work.

Please follow the below guidelines regarding your github repository:

The folder structure of your github account should be as followed:

```
├── src                       # Source files (your python code)
├── data                      # Data related to the project
├── result                    # Result of the project (e.g., plots, reports)
└── doc                       # Documentation files (additional documentations)
```

Try to explore this dataset, in particular, you can answer the following questions:

- Display top 10 destination flights from NYC in a bar graph, add title and labels for axes
- Show the bar graph for average departure delay by origin
- Show the bar graph for average departure delay by carrier

In [4]:

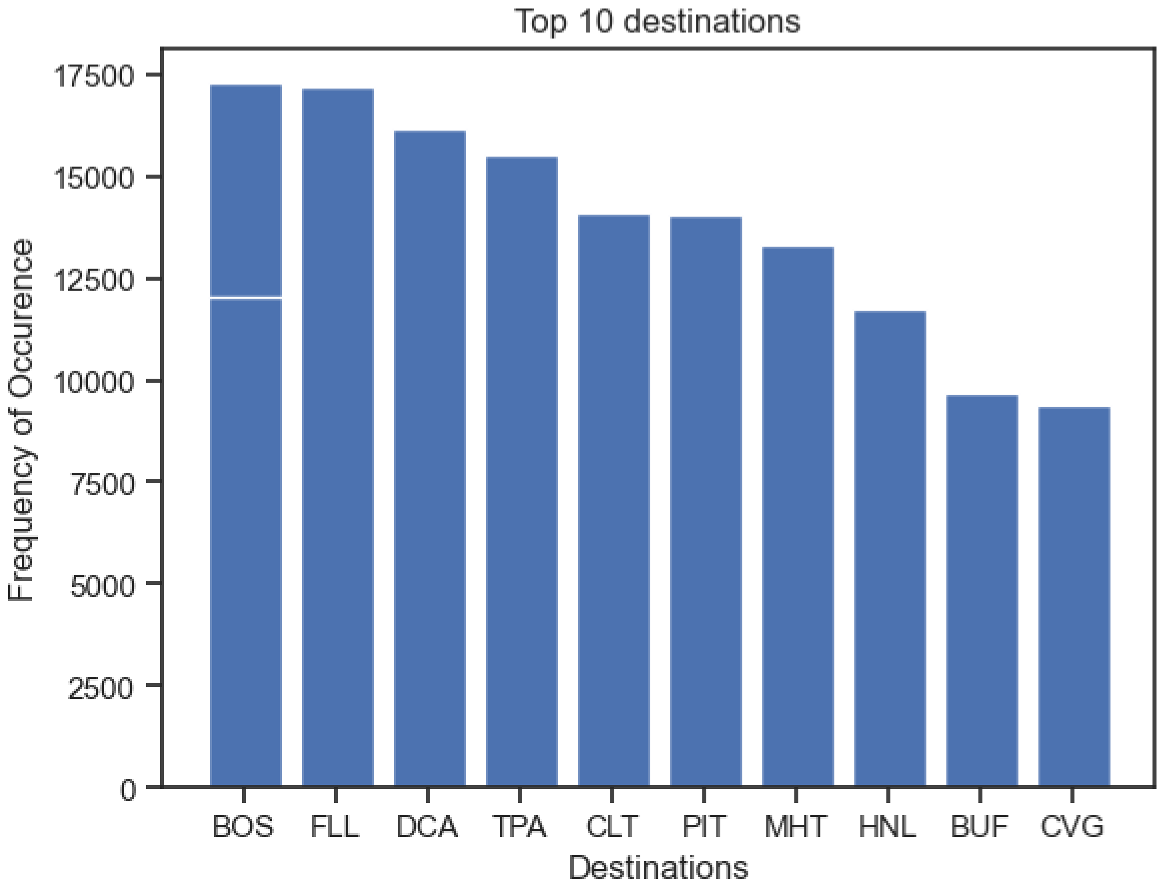
```
flight = pd.read_csv('flight_data.csv')
flight.head()
```

Out[4]:

	year	month	day	dep_time	sched_dep_time	dep_delay	arr_time	sched_arr_time	arr_delay	carrier	flight
0	2013	1	1	517.0	515	2.0	830.0	819	11.0	UA	1545
1	2013	1	1	533.0	529	4.0	850.0	830	20.0	UA	1714
2	2013	1	1	542.0	540	2.0	923.0	850	33.0	AA	1141
3	2013	1	1	544.0	545	-1.0	1004.0	1022	-18.0	B6	725
4	2013	1	1	554.0	600	-6.0	812.0	837	-25.0	DL	461

In [5]:

```
# Display top 10 destination flights from NYC in a bar graph, add title and labels for a

plt.bar(flight["dest"][flight["dest"].value_counts().head(11)], flight["dest"].value_cou
plt.title("Top 10 destinations")
plt.xlabel("Destinations")
plt.ylabel("Frequency of Occurence")
plt.show()
```



In [74]:

```
# List of top 10 flight destinations
top_des = flight['dest'].value_counts().head(10)
top_des
```

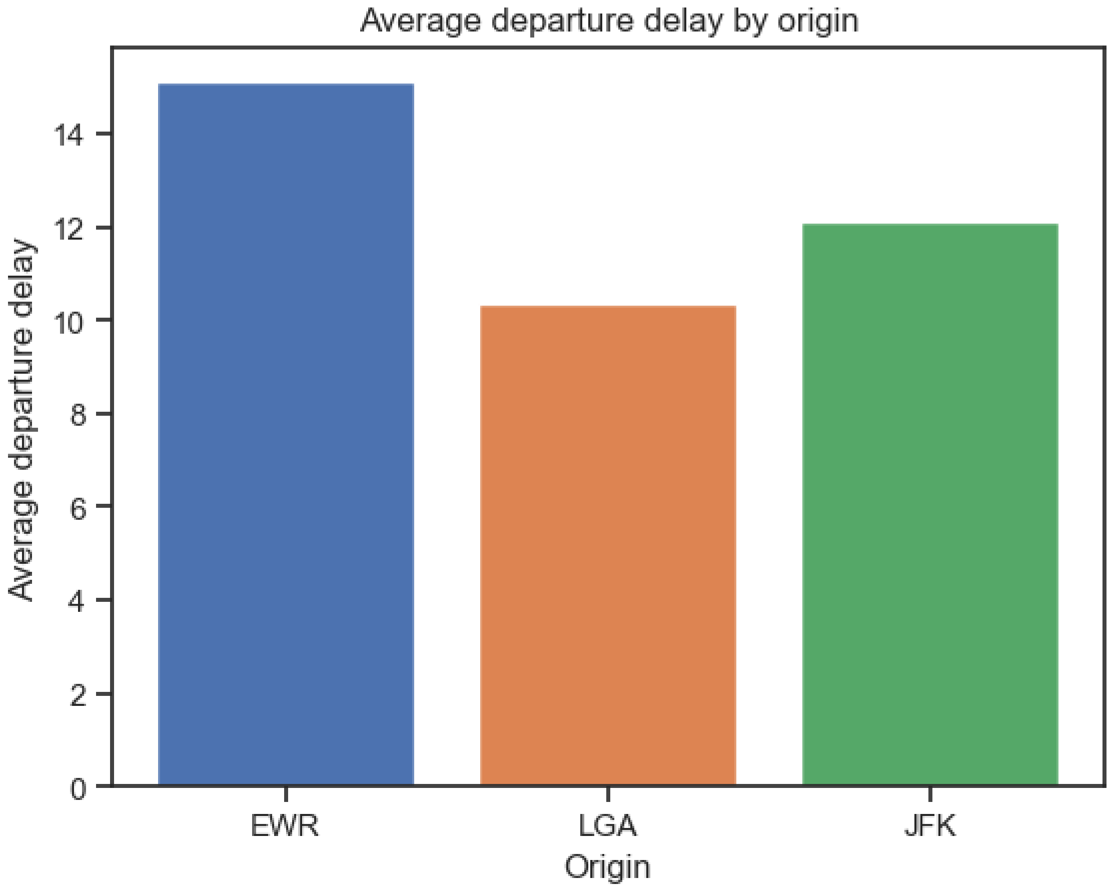
Out[74]:

```
ORD    17283
ATL    17215
LAX    16174
BOS    15508
```

```
MCO    14082
CLT    14064
SFO    13331
FLL    12055
MIA    11728
DCA     9705
Name: dest, dtype: int64
```

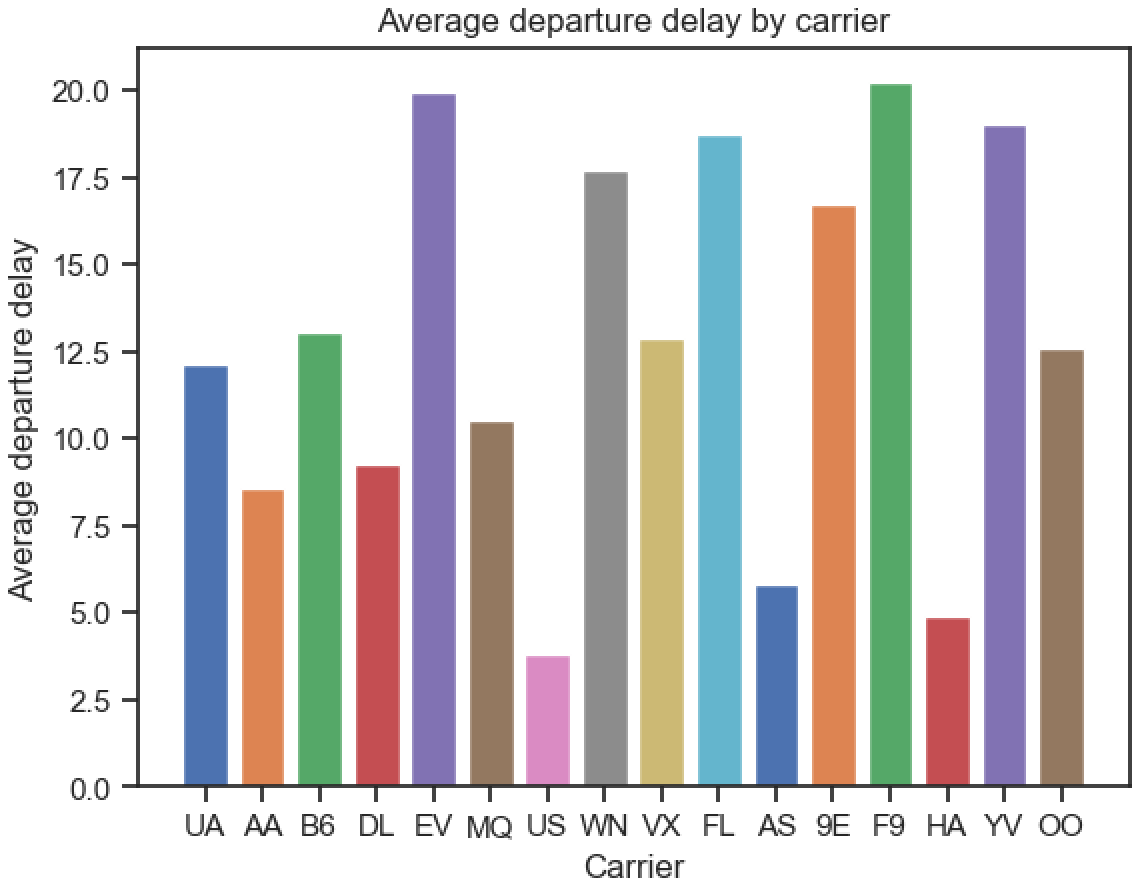
In [6]:

```
# Show the bar graph for average departure delay by origin

for i in flight["origin"].unique():
    mean=flight["dep_delay"][flight["origin"]==i].mean()
    plt.bar(i,mean)
plt.title("Average departure delay by origin")
plt.xlabel("Origin")
plt.ylabel("Average departure delay")
plt.show()
```



In [7]:

```
# Show the bar graph for average departure delay by carrier

for i in flight["carrier"].unique():
    mean=flight["dep_delay"][flight["carrier"]==i].mean()
    plt.bar(i,mean)
plt.title("Average departure delay by carrier")
plt.xlabel("Carrier")
plt.ylabel("Average departure delay")
plt.show()
```



Exercise 3

The two datasets for this question are exported from this Kaggle competition. You can read more about these two datasets here: https://www.kaggle.com/uciml/restaurant-data-with-consumer-ratings?select=rating_final.csv

Download final_rating.csv and userprofile.csv from D2L.

Read both datasets in python and answer the following questions.

1. How many times each user has rated? 2.Plot the rating distribution. 3.Plot the food rating and service rating distribution 4.Plot the relationship between height and weight. Can you fit a regression line? 5.What is the average height of the users per drink_level? Create the appropriate plot.

In [ ]:

```
```

In [9]:

```
#Read dataset
finalrating = pd.read_csv('rating_final.csv')
finalrating.head()
```

Out[9]:

	userID	placeID	rating	food_rating	service_rating
0	U1077	135085	2	2	2
1	U1077	135038	2	2	1
2	U1077	132825	2	2	2
3	U1077	135060	1	2	2
4	U1068	135104	1	1	2

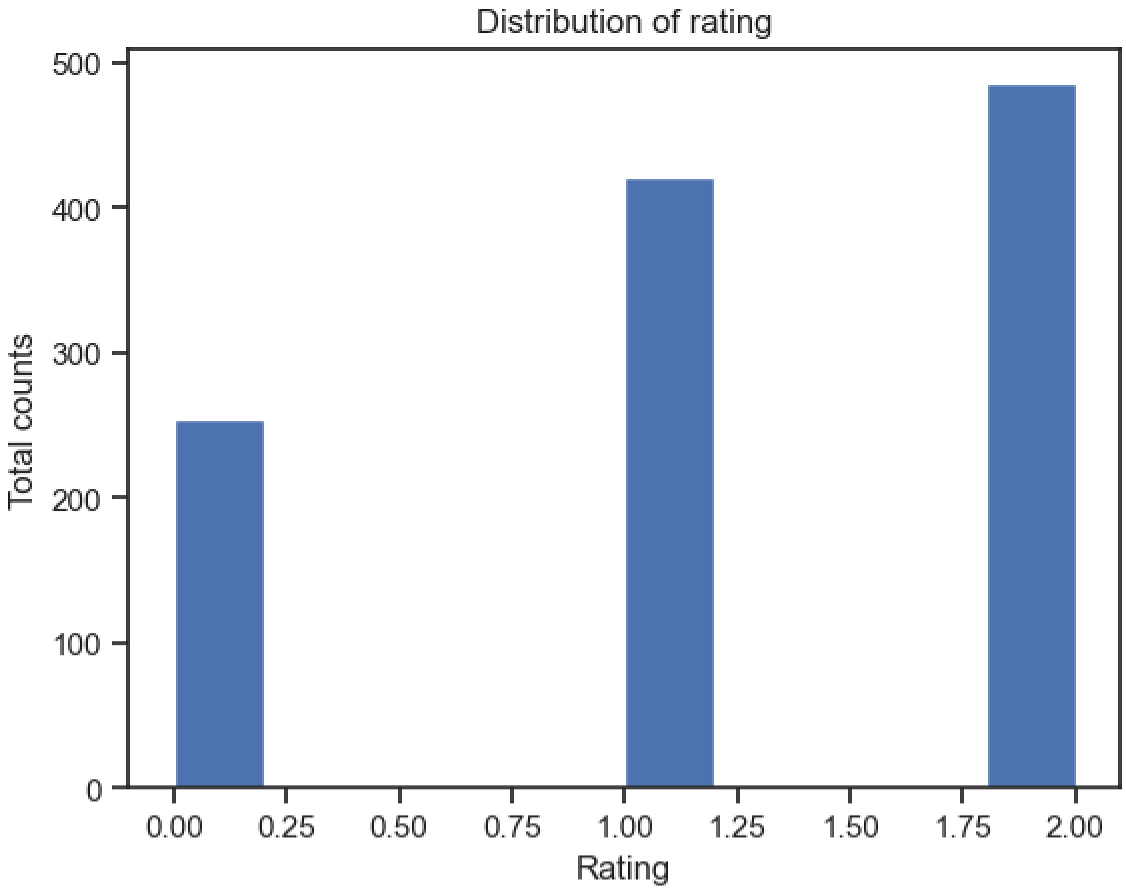
In [12]:

```
#How many times each user has rated?
for i in finalrating["userID"].unique():
    print("User with ID:", i, "number of ratings:", finalrating["rating"][finalrating["u
```

```
User with ID: U1077 number of ratings: 5
User with ID: U1068 number of ratings: 8
User with ID: U1067 number of ratings: 6
User with ID: U1103 number of ratings: 8
User with ID: U1107 number of ratings: 3
User with ID: U1044 number of ratings: 5
User with ID: U1070 number of ratings: 3
User with ID: U1031 number of ratings: 3
User with ID: U1082 number of ratings: 9
User with ID: U1023 number of ratings: 4
User with ID: U1060 number of ratings: 4
User with ID: U1015 number of ratings: 8
User with ID: U1123 number of ratings: 8
User with ID: U1021 number of ratings: 3
User with ID: U1026 number of ratings: 5
User with ID: U1083 number of ratings: 9
User with ID: U1108 number of ratings: 10
User with ID: U1012 number of ratings: 5
User with ID: U1093 number of ratings: 8
User with ID: U1030 number of ratings: 8
User with ID: U1066 number of ratings: 5
User with ID: U1127 number of ratings: 4
User with ID: U1017 number of ratings: 3
User with ID: U1100 number of ratings: 6
User with ID: U1133 number of ratings: 9
User with ID: U1118 number of ratings: 7
User with ID: U1072 number of ratings: 4
User with ID: U1080 number of ratings: 6
User with ID: U1063 number of ratings: 5
User with ID: U1074 number of ratings: 3
User with ID: U1117 number of ratings: 6
User with ID: U1020 number of ratings: 4
User with ID: U1051 number of ratings: 4
User with ID: U1055 number of ratings: 10
User with ID: U1053 number of ratings: 13
User with ID: U1035 number of ratings: 6
User with ID: U1064 number of ratings: 5
User with ID: U1081 number of ratings: 11
User with ID: U1001 number of ratings: 9
User with ID: U1014 number of ratings: 11
User with ID: U1088 number of ratings: 12
User with ID: U1056 number of ratings: 10
User with ID: U1134 number of ratings: 16
User with ID: U1106 number of ratings: 18
User with ID: U1126 number of ratings: 10
User with ID: U1124 number of ratings: 10
User with ID: U1018 number of ratings: 10
User with ID: U1125 number of ratings: 11
User with ID: U1119 number of ratings: 5
User with ID: U1076 number of ratings: 5
User with ID: U1022 number of ratings: 14
User with ID: U1094 number of ratings: 8
User with ID: U1116 number of ratings: 11
User with ID: U1105 number of ratings: 8
User with ID: U1075 number of ratings: 12
User with ID: U1007 number of ratings: 9
User with ID: U1115 number of ratings: 8
User with ID: U1024 number of ratings: 15
User with ID: U1132 number of ratings: 10
User with ID: U1005 number of ratings: 9
User with ID: U1120 number of ratings: 9
User with ID: U1004 number of ratings: 8
User with ID: U1037 number of ratings: 11
User with ID: U1052 number of ratings: 4
User with ID: U1036 number of ratings: 12
User with ID: U1038 number of ratings: 5
User with ID: U1071 number of ratings: 13
User with ID: U1114 number of ratings: 11
User with ID: U1084 number of ratings: 10
User with ID: U1049 number of ratings: 9
User with ID: U1019 number of ratings: 9
User with ID: U1069 number of ratings: 9
User with ID: U1113 number of ratings: 8
User with ID: U1104 number of ratings: 12
User with ID: U1079 number of ratings: 4
User with ID: U1045 number of ratings: 10
User with ID: U1009 number of ratings: 11
User with ID: U1016 number of ratings: 13
User with ID: U1047 number of ratings: 3
User with ID: U1095 number of ratings: 10
User with ID: U1034 number of ratings: 6
User with ID: U1078 number of ratings: 7
User with ID: U1099 number of ratings: 11
User with ID: U1008 number of ratings: 9
User with ID: U1040 number of ratings: 4
User with ID: U1121 number of ratings: 4
User with ID: U1110 number of ratings: 4
User with ID: U1042 number of ratings: 5
User with ID: U1013 number of ratings: 10
User with ID: U1054 number of ratings: 11
User with ID: U1111 number of ratings: 11
User with ID: U1128 number of ratings: 11
User with ID: U1062 number of ratings: 9
User with ID: U1101 number of ratings: 10
User with ID: U1135 number of ratings: 14
User with ID: U1032 number of ratings: 10
User with ID: U1048 number of ratings: 7
User with ID: U1092 number of ratings: 6
User with ID: U1085 number of ratings: 10
User with ID: U1109 number of ratings: 10
User with ID: U1102 number of ratings: 5
User with ID: U1098 number of ratings: 12
User with ID: U1046 number of ratings: 9
User with ID: U1122 number of ratings: 12
User with ID: U1138 number of ratings: 3
User with ID: U1033 number of ratings: 11
User with ID: U1089 number of ratings: 14
User with ID: U1003 number of ratings: 13
User with ID: U1091 number of ratings: 9
User with ID: U1027 number of ratings: 11
User with ID: U1029 number of ratings: 10
User with ID: U1086 number of ratings: 9
User with ID: U1137 number of ratings: 14
User with ID: U1090 number of ratings: 10
User with ID: U1061 number of ratings: 18
User with ID: U1041 number of ratings: 6
User with ID: U1059 number of ratings: 10
User with ID: U1112 number of ratings: 13
User with ID: U1057 number of ratings: 11
User with ID: U1025 number of ratings: 11
User with ID: U1097 number of ratings: 13
User with ID: U1006 number of ratings: 11
User with ID: U1131 number of ratings: 6
User with ID: U1073 number of ratings: 11
User with ID: U1058 number of ratings: 10
User with ID: U1002 number of ratings: 10
User with ID: U1096 number of ratings: 11
User with ID: U1136 number of ratings: 10
User with ID: U1010 number of ratings: 8
User with ID: U1028 number of ratings: 7
User with ID: U1050 number of ratings: 7
User with ID: U1129 number of ratings: 4
User with ID: U1087 number of ratings: 8
User with ID: U1065 number of ratings: 5
User with ID: U1039 number of ratings: 3
User with ID: U1130 number of ratings: 4
User with ID: U1043 number of ratings: 5
User with ID: U1011 number of ratings: 3
```

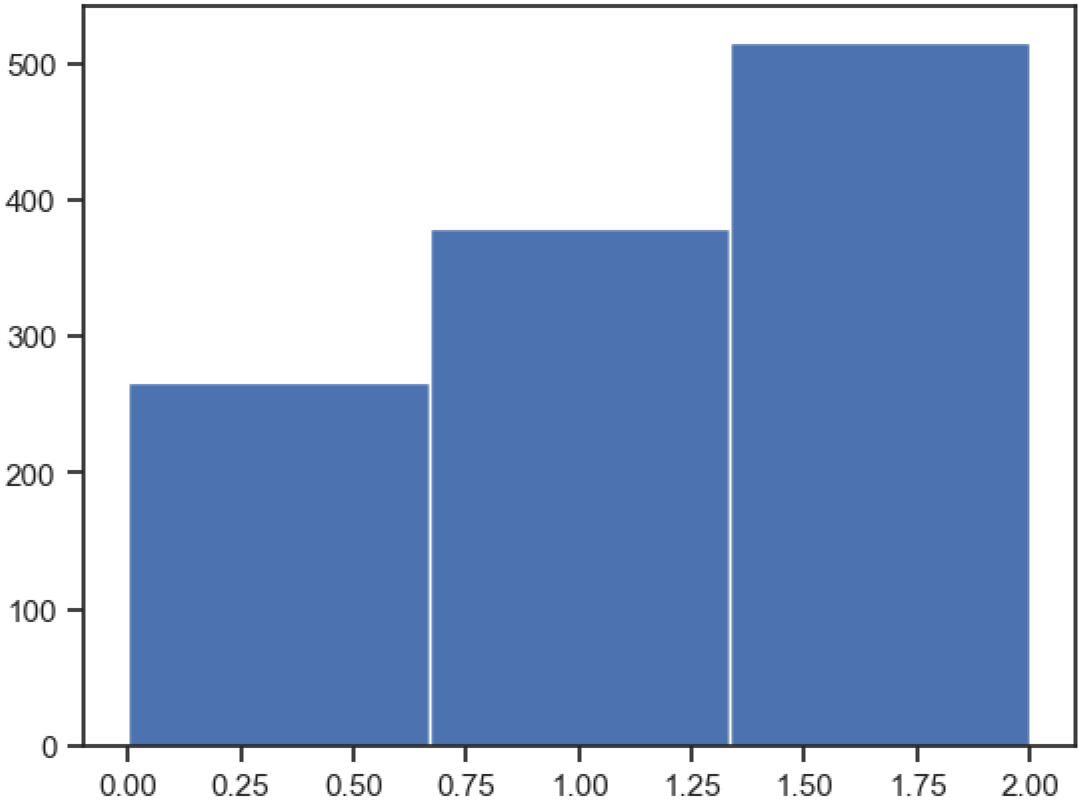
In [33]:

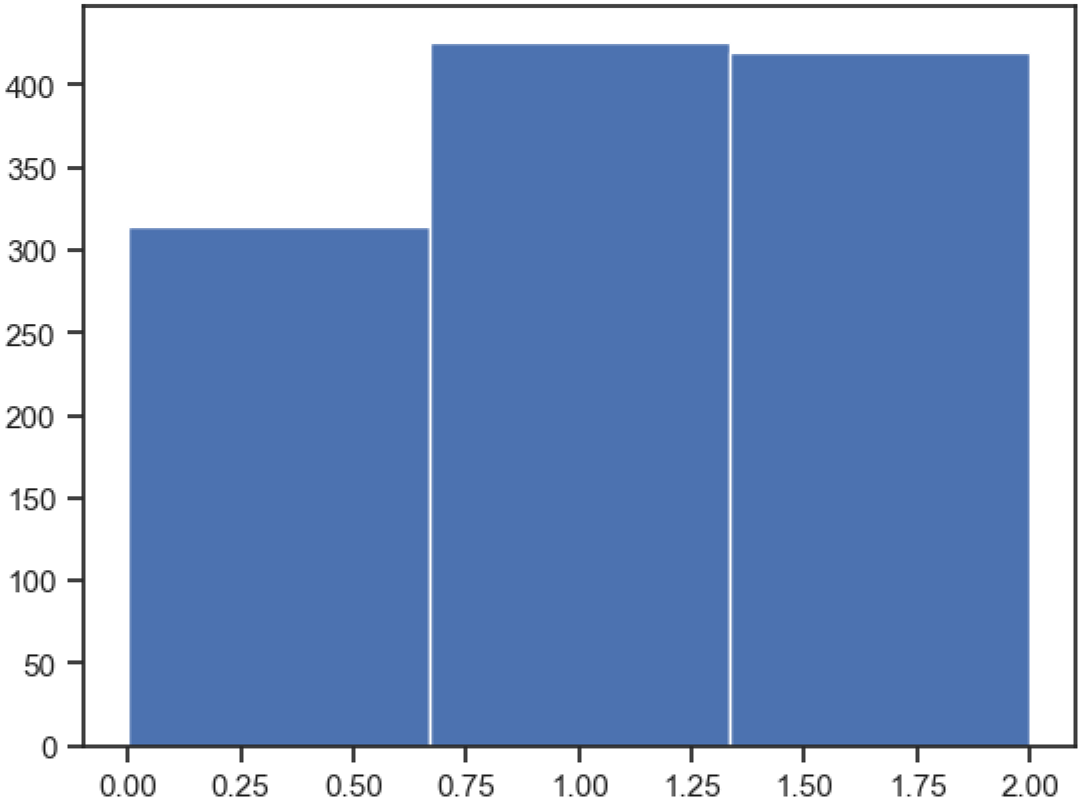
```
#Plot the rating distribution
plt.hist(finalrating['rating'])
plt.title('Distribution of rating')
plt.xlabel('Rating')
plt.ylabel('Total counts')
plt.show()
```



In [13]:

```
# Plot the food rating and service rating distribution

plt.hist(finalrating["food_rating"], bins = 3)
plt.show()
plt.hist(finalrating["service_rating"], bins = 3)
plt.show()
```





In [26]:

```
#Read dataset
userprofile = pd.read_csv('userprofile.csv')
userprofile.head()
```

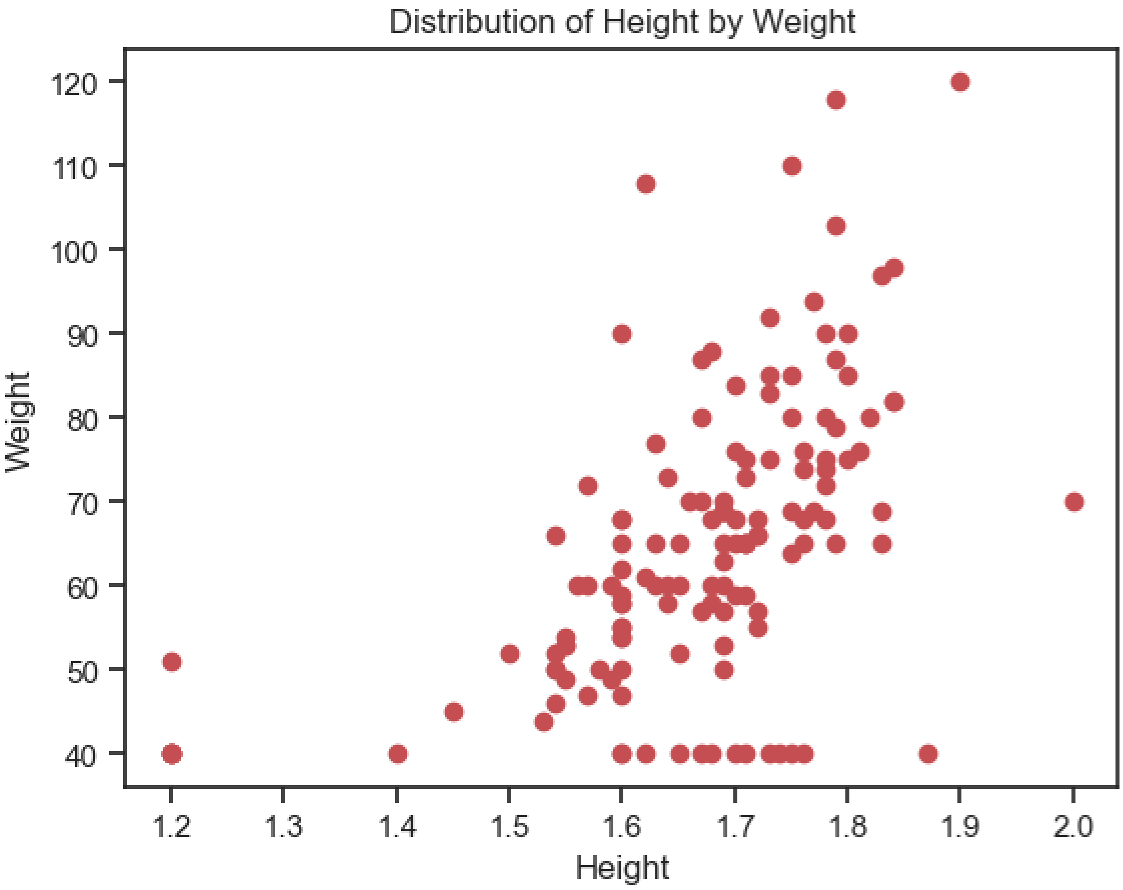
Out[26]:

	userID	latitude	longitude	smoker	drink_level	dress_preference	ambience	transport	marital_status	
0	U1001	22.139997	-100.978803	false	abstemious	informal	family	on foot	single	ind
1	U1002	22.150087	-100.983325	false	abstemious	informal	family	public	single	ind
2	U1003	22.119847	-100.946527	false	social	formal	family	public	single	ind

					drinker					
3	U1004	18.867000	-99.183000	false	abstemious	informal	family	public	single	ind
4	U1005	22.183477	-100.959891	false	abstemious	no preference	family	public	single	ind

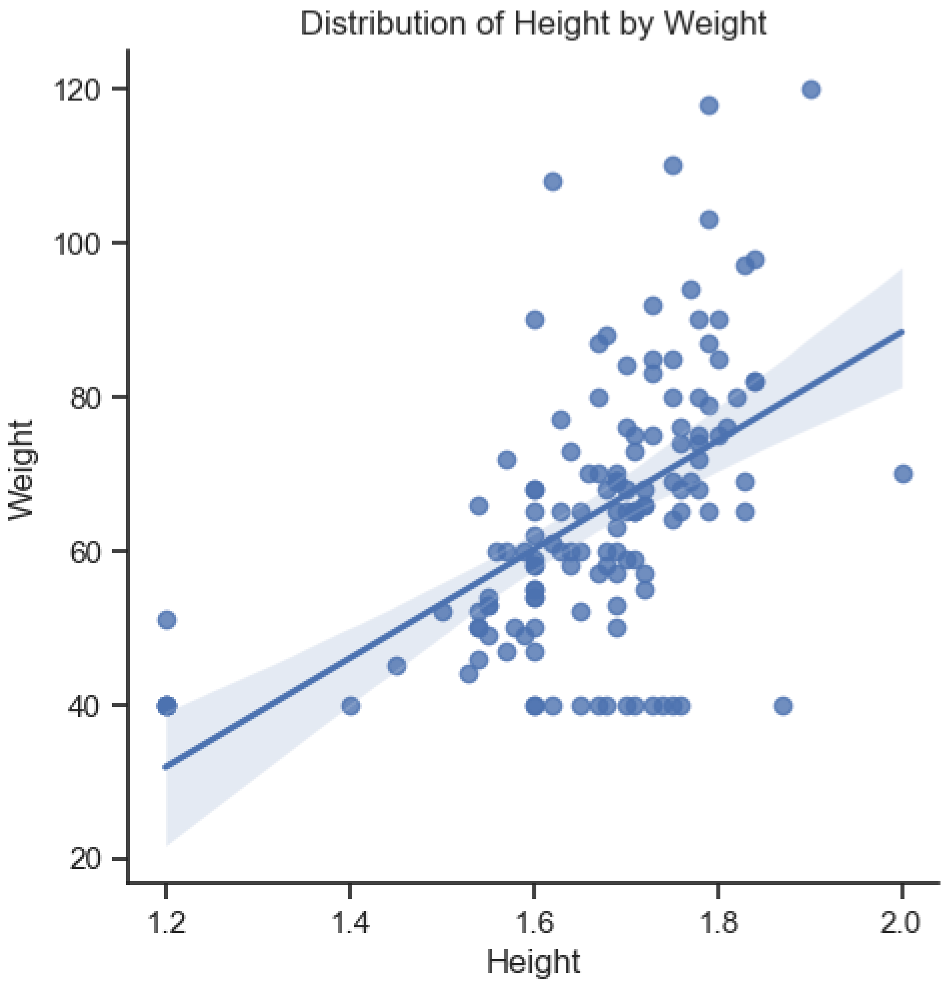
In [39]:

```
plt.scatter(np.array(userprofile['height']), np.array(userprofile['weight']), color ='r'
plt.xlabel('Height')
plt.ylabel("Weight")
plt.title('Distribution of Height by Weight')
plt.show()
```



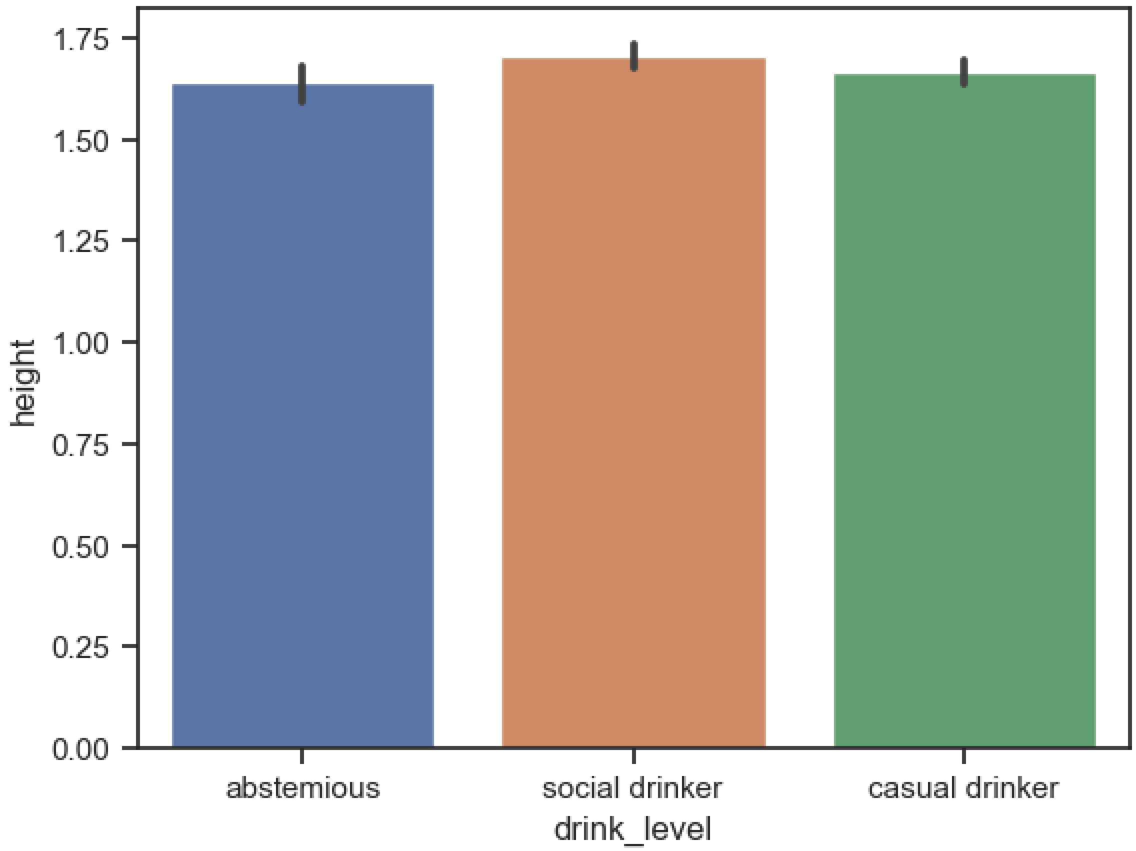
In [43]:

```
sns.lmplot(x = 'height', y = 'weight', data = userprofile, fit_reg=True)
plt.xlabel('Height')
plt.ylabel("Weight")
plt.title('Distribution of Height by Weight')
plt.show()
```



In [45]:

```
sns.barplot(x = "drink_level", y = "height", data = userprofile)
plt.show()
```



In [47]:

```
#Option 1:
```

```
userprofile.groupby('drink_level')['height'].mean()
```

Out[47]:

```
drink_level
abstemious        1.641373
casual drinker    1.665319
social drinker    1.703500
Name: height, dtype: float64
```

In [48]:

```
#Option 2:
userprofile.groupby('drink_level')['height'].describe()
```

Out[48]:

drink_level	count	mean	std	min	25%	50%	75%	max
abstemious	51.0	1.641373	0.161728	1.2	1.60	1.68	1.750	1.90
casual drinker	47.0	1.665319	0.109740	1.2	1.60	1.68	1.725	1.84
social drinker	40.0	1.703500	0.099164	1.5	1.62	1.71	1.765	2.00

In [ ]: