In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

In [3]:
```
df=pd.read_csv('Task 3 Mall_Customers.csv')
```

In [4]:
```
df.head()
```

Out[4]:

	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40

In [5]:
```
df.tail()
```

Out[5]:

	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
195	196	Female	35	120	79
196	197	Female	45	126	28
197	198	Male	32	126	74
198	199	Male	32	137	18
199	200	Male	30	137	83

In [6]:
```
df.rename(columns={'Genre': 'Gender'}, inplace=True)
```

In [7]:
```
df.isna().sum()
```

Out[7]:
```
CustomerID                0
Gender                    0
Age                       0
Annual Income (k$)        0
Spending Score (1-100)    0
dtype: int64
```

In [8]:
```
df.columns
```

Out[8]:
```
Index(['CustomerID', 'Gender', 'Age', 'Annual Income (k$)',
       'Spending Score (1-100)'],
      dtype='object')
```

In [9]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
 #   Column                  Non-Null Count  Dtype 
---  ------                  --------------  ----- 
 0   CustomerID              200 non-null    int64 
 1   Gender                  200 non-null    object
 2   Age                     200 non-null    int64 
 3   Annual Income (k$)      200 non-null    int64 
 4   Spending Score (1-100)  200 non-null    int64 
dtypes: int64(4), object(1)
memory usage: 7.9+ KB
```

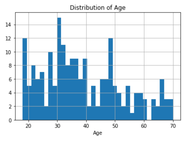
In [10]:
```
df.describe()
```

Out[10]:

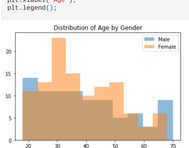
	CustomerID	Age	Annual Income (k$)	Spending Score (1-100)
count	200.000000	200.000000	200.000000	200.000000
mean	100.500000	38.850000	60.560000	50.200000
std	57.879185	13.969007	26.264721	25.823522
min	1.000000	18.000000	15.000000	1.000000
25%	50.750000	28.750000	41.500000	34.750000
50%	100.500000	36.000000	61.500000	50.000000
75%	150.250000	49.000000	78.000000	73.000000
max	200.000000	70.000000	137.000000	99.000000

In [11]:
```
sns.countplot(x='Gender', data=df);
plt.title('Distribution of Gender');
```

In [12]:
```
df.hist('Age', bins=35);
plt.title('Distribution of Age');
plt.xlabel('Age');
```

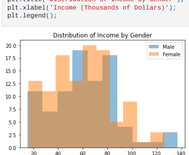


In [13]:
```
plt.hist('Age', data=df[df['Gender'] == 'Male'], alpha=0.5, label='Male');
plt.hist('Age', data=df[df['Gender'] == 'Female'], alpha=0.5, label='Female');
plt.title('Distribution of Age by Gender');
plt.xlabel('Age');
plt.legend();
```



In [14]:
```
df.hist('Annual Income (k$)');
plt.title('Annual Income Distribution in Thousands of Dollars');
plt.xlabel('Thousands of Dollars');
```

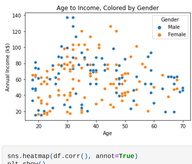
In [15]:
```
plt.hist('Annual Income (k$)', data=df[df['Gender'] == 'Male'], alpha=0.5, label='Male');
plt.hist('Annual Income (k$)', data=df[df['Gender'] == 'Female'], alpha=0.5, label='Female');
plt.title('Distribution of Income by Gender');
plt.xlabel('Income (Thousands of Dollars)');
plt.legend();
```



In [16]:
```
male_customers = df[df['Gender'] == 'Male']
female_customers =df[df['Gender'] == 'Female']
print(male_customers['Spending Score (1-100)'].mean())
print(female_customers['Spending Score (1-100)'].mean())
```

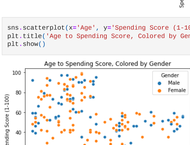
```
48.51136363636363
51.52678571428715
```

In [17]:
```
sns.scatterplot(x='Age', y='Annual Income (k$)', hue='Gender', data=df)
plt.title('Age to Income, Colored by Gender')
plt.show()
```

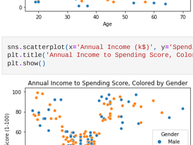


In [18]:
```
sns.heatmap(df.corr(), annot=True)
plt.show()
```

In [19]:
```
sns.scatterplot(x='Age', y='Spending Score (1-100)', hue='Gender', data=df)
plt.title('Age to Spending Score, Colored by Gender')
plt.show()
```



In [20]:
```
sns.scatterplot(x='Annual Income (k$)', y='Spending Score (1-100)', hue='Gender', data=df)
plt.title('Annual Income to Spending Score, Colored by Gender')
plt.show()
```



In [ ]: