Aerofit

Aerofit is a leading brand in the field of fitness equipment. Aerofit provides a product range including machines such as treadmills, exercise bikes, gym equipment, and fitness accessories to cater to the needs of all categories of people.

Business Problem

The market research team at AeroFit wants to identify the characteristics of the target audience for each type of treadmill offered by the company, to provide a better recommendation of the treadmills to the new customers. The team decides to investigate whether there are differences across the product with respect to customer characteristics.

1. Perform descriptive analytics to create a customer profile for each AeroFit treadmill product by developing appropriate tables and charts.
2. For each AeroFit treadmill product, construct two-way contingency tables and compute all conditional and marginal probabilities along with their insights/impact on the business.

Basics of DataSet

The company collected the data on individuals who purchased a treadmill from the AeroFit stores during the prior three months. The dataset has the following features: Dataset link: Aerofit_treadmill.csv (https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/001/125/original/aerofit_treadm
1639992749)

- Product Purchased: KP281, KP481, or KP781
- Age: In years
- Gender: Male/Female
- Education: In years
- MaritalStatus: Single or partnered
- Usage: The average number of times the customer plans to use the treadmill each week.
- Income: Annual income (in $)
- Fitness: Self-rated fitness on a 1-to-5 scale, where 1 is the poor shape and 5 is the excellent
- Miles: The average number of miles the customer expects to walk/run each week
- Product Portfolio:

    1. The KP281 is an entry-level treadmill that sells for $1,500.
    2. The KP481 is for mid-level runners that sell for $1,750.
    3. The KP781 treadmill is having advanced features that sell for $2,500.

Importing Libraries

In [1]:

```
#Importing all the necessary libraries

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

Loading File

In [2]:

```
!wget https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/001/125/original/ae
```

```
--2024-03-20 15:44:30--  https://d2beiqkhq929f0.cloudfront.net/public_assets/assets/000/
001/125/original/aerofit_treadmill.csv?1639992749
Resolving d2beiqkhq929f0.cloudfront.net (d2beiqkhq929f0.cloudfront.net)... 18.172.139.4
6, 18.172.139.94, 18.172.139.61, ...
Connecting to d2beiqkhq929f0.cloudfront.net (d2beiqkhq929f0.cloudfront.net)|18.172.139.4
6|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 7279 (7.1K) [text/plain]
Saving to: ‘aerofit-data.csv’

aerofit-data.csv    100%[===================>]   7.11K  --.-KB/s    in 0s

2024-03-20 15:44:30 (160 MB/s) - ‘aerofit-data.csv’ saved [7279/7279]
```

In [3]:

```
#Loading the Dataset

data = pd.read_csv("aerofit-data.csv")
```

Basic Information

In [4]:

```
#The top 5 and the last 5 entries

data
```

Out[4]:

	Product	Age	Gender	Education	MaritalStatus	Usage	Fitness	Income	Miles
0	KP281	18	Male	14	Single	3	4	29562	112
1	KP281	19	Male	15	Single	2	3	31836	75
2	KP281	19	Female	14	Partnered	4	3	30699	66
3	KP281	19	Male	12	Single	3	3	32973	85
4	KP281	20	Male	13	Partnered	4	2	35247	47
...	...	...	...	...	...	...	...	...	...
175	KP781	40	Male	21	Single	6	5	83416	200
176	KP781	42	Male	18	Single	5	4	89641	200
177	KP781	45	Male	16	Single	5	5	90886	160
178	KP781	47	Male	18	Partnered	4	5	104581	120
179	KP781	48	Male	18	Partnered	4	5	95508	180

180 rows × 9 columns

In [5]:

```
#Details of Columns

data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 180 entries, 0 to 179
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   Product        180 non-null    object
 1   Age            180 non-null    int64 
 2   Gender         180 non-null    object
 3   Education      180 non-null    int64 
 4   MaritalStatus  180 non-null    object
 5   Usage          180 non-null    int64 
 6   Fitness        180 non-null    int64 
 7   Income         180 non-null    int64 
 8   Miles          180 non-null    int64 
dtypes: int64(6), object(3)
memory usage: 12.8+ KB
```

In [6]:

```
#Number of columns and rows

data.shape
```

Out[6]:

```
(180, 9)
```

In [7]:

```
#Data-types of Columns

data.dtypes
```

Out[7]:

```
Product          object
Age               int64
Gender           object
Education         int64
MaritalStatus    object
Usage             int64
Fitness           int64
Income            int64
Miles             int64
dtype: object
```

In [8]:

```
#Changing the data-type from object to category

data['Product'] = data['Product'].astype('category')
data['Gender'] = data['Gender'].astype('category')
data['MaritalStatus'] = data['MaritalStatus'].astype('category')
data.dtypes
```

Out[8]:

```
Product          category
Age                 int64
Gender           category
Education           int64
MaritalStatus    category
Usage               int64
Fitness             int64
Income              int64
Miles               int64
dtype: object
```

In [9]:

```
#Description of data in a dataframe

data.describe()
```

Out[9]:

	Age	Education	Usage	Fitness	Income	Miles
count	180.000000	180.000000	180.000000	180.000000	180.000000	180.000000
mean	28.788889	15.572222	3.455556	3.311111	53719.577778	103.194444
std	6.943498	1.617055	1.084797	0.958869	16506.684226	51.863605
min	18.000000	12.000000	2.000000	1.000000	29562.000000	21.000000
25%	24.000000	14.000000	3.000000	3.000000	44058.750000	66.000000
50%	26.000000	16.000000	3.000000	3.000000	50596.500000	94.000000
75%	33.000000	16.000000	4.000000	4.000000	58668.000000	114.750000
max	50.000000	21.000000	7.000000	5.000000	104581.000000	360.000000

> # Descriptive Analysis

- Total count of all columns is 180

- Age: Mean age of the customer is 28 years, half of the customer's mean age is 26.
- Education: Mean Education is 15 with maximum as 21 and minimum as 12.
- Usage: Mean Usage per week is 3.4, with maximum as 7 and minimum as 2.
- Fitness: Average rating is 3.3 on a scale of 1 to 5.
- Miles: Average number of miles the customer walks is 103 with maximum distance travelled by most people is almost 115 and minimum is 21.
- Income (in $): Most customer earns around 58K annually, with maximum of 104K and minimum almost 30K

Number of Unique Entries

In [10]:

```
#Number of unique Products

data['Product'].nunique()
```

Out[10]:

```
3
```

In [11]:

```
#Number of unique age of people

data['Age'].nunique()
```

Out[11]:

```
32
```

In [12]:

```
#Number of unique genders

data['Gender'].nunique()
```

Out[12]:

```
2
```

In [13]:

```
#Number of unique entries of fitness

data['Fitness'].nunique()
```

Out[13]:

```
5
```

```
#Count of unique entries of education
```

In [14]:

```
data['Education'].nunique()
```

Out[14]:

```
8
```

In [15]:

```
#Number of unique entries of Usage

data['Usage'].nunique()
```

Out[15]:

```
6
```

Unique Entries

In [16]:

```
#Name of all Products

data['Product'].unique().tolist()
```

Out[16]:

```
['KP281', 'KP481', 'KP781']
```

In [17]:

```
#All entries of age

data['Age'].unique().tolist()
```

Out[17]:

```
[18,
 19,
 20,
 21,
 22,
 23,
 24,
 25,
 26,
 27,
 28,
 29,
 30,
 31,
 32,
 33,
 34,
 35,
 36,
 37,
 38,
 39,
 40,
 41,
 43,
 44,
 46,
 47,
 50,
 45,
 48,
 42]
```

In [18]:

```
#All unique entries of education

data['Education'].unique().tolist()
```

Out[18]:

```
[14, 15, 12, 13, 16, 18, 20, 21]
```

In [19]:

```
#Counting unique age entries

nProd = data['Product'].value_counts()
nProd
```

Out[19]:

```
KP281    80
KP481    60
KP781    40
Name: Product, dtype: int64
```

In [20]:

```
#Number of males and females

data['Gender'].value_counts()
```

Out[20]:

```
Male      104
Female     76
Name: Gender, dtype: int64
```

In [21]:

```
#Count of entries of Fitness

nFit = data['Fitness'].value_counts()
nFit
```

Out[21]:

```
3    97
5    31
2    26
4    24
1     2
Name: Fitness, dtype: int64
```

In [22]:

```
#Count of Marrired and Unmarried People

nMariS = data['MaritalStatus'].value_counts()
nMariS
```

Out[22]:

```
Partnered    107
Single        73
Name: MaritalStatus, dtype: int64
```

In [23]:

```
#Number of entries of Usage

nUse = data['Usage'].value_counts()
nUse
```

Out[23]:

```
3    69
4    52
2    33
5    17
6     7
7     2
Name: Usage, dtype: int64
```

In [24]:

```
#Counting number of entries of specific ages

nAge = data['Age'].value_counts()
nAge
```

Out[24]:

```
25    25
23    18
24    12
26    12
28     9
35     8
33     8
30     7
38     7
21     7
```

```
22      7
27      7
31      6
34      6
29      6
20      5
40      5
32      4
19      4
48      2
37      2
45      2
47      2
46      1
50      1
18      1
44      1
43      1
41      1
39      1
36      1
42      1
Name: Age, dtype: int64
```

In Percentage

In [25]:

```
#Percentage of users of all machines

(nProd/len(data))*100
```

Out[25]:

```
KP281    44.444444
KP481    33.333333
KP781    22.222222
Name: Product, dtype: float64
```

In [26]:

```
#Calculating percentage of people's age

(nAge/len(data))*100
```

Out[26]:

```
25    13.888889
23    10.000000
24     6.666667
26     6.666667
28     5.000000
35     4.444444
33     4.444444
30     3.888889
38     3.888889
21     3.888889
22     3.888889
27     3.888889
31     3.333333
34     3.333333
29     3.333333
20     2.777778
40     2.777778
32     2.222222
19     2.222222
48     1.111111
37     1.111111
45     1.111111
47     1.111111
46     0.555556
50     0.555556
```

```
18      0.555556
44      0.555556
43      0.555556
41      0.555556
39      0.555556
36      0.555556
42      0.555556
Name: Age, dtype: float64
```

In [27]:

```
#Precentage of entries of  fitness

(nFit / len(data)) * 100
```

Out[27]:

```
3    53.888889
5    17.222222
2    14.444444
4    13.333333
1     1.111111
Name: Fitness, dtype: float64
```

In [28]:

```
#Percentage of married and unmarried people

(nMariS/len(data))*100
```

Out[28]:

```
Partnered    59.444444
Single       40.555556
Name: MaritalStatus, dtype: float64
```

In [29]:

```
#Percentage of various entries of Usage

(nUse/len(data))* 100
```

Out[29]:

```
3    38.333333
4    28.888889
2    18.333333
5     9.444444
6     3.888889
7     1.111111
Name: Usage, dtype: float64
```

Summary

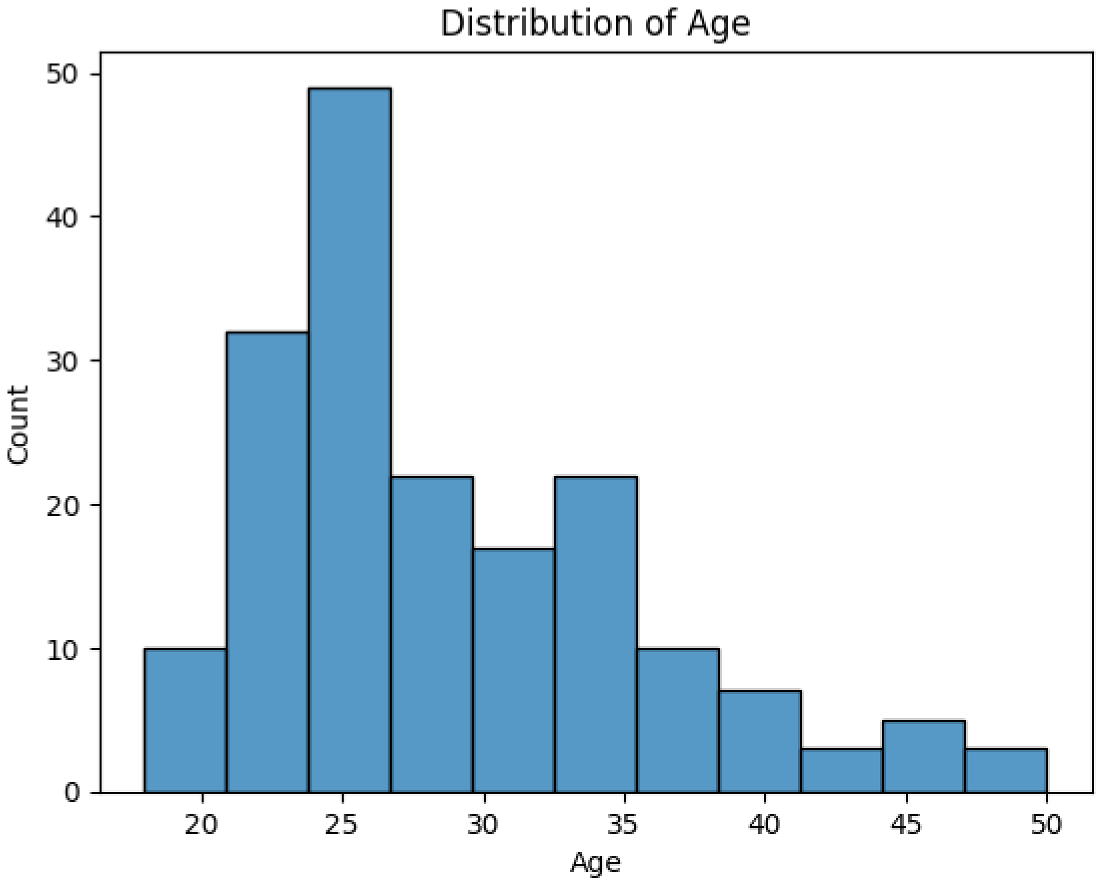
- KP281, KP481, KP781 are the 3 different products
- Most commonly purchased treadmill product type is KP281
- There are 32 unique ages
- 104 Males and 76 Females are in the customers list
- 8 unique set of Educations (14, 15, 12, 13, 16, 18, 20, 21)
- Highest rated Fitness rating is 3
- Most customers usage treadmill atleast 3 days per week
- Majority of the customers who have purchased are Married/Partnered

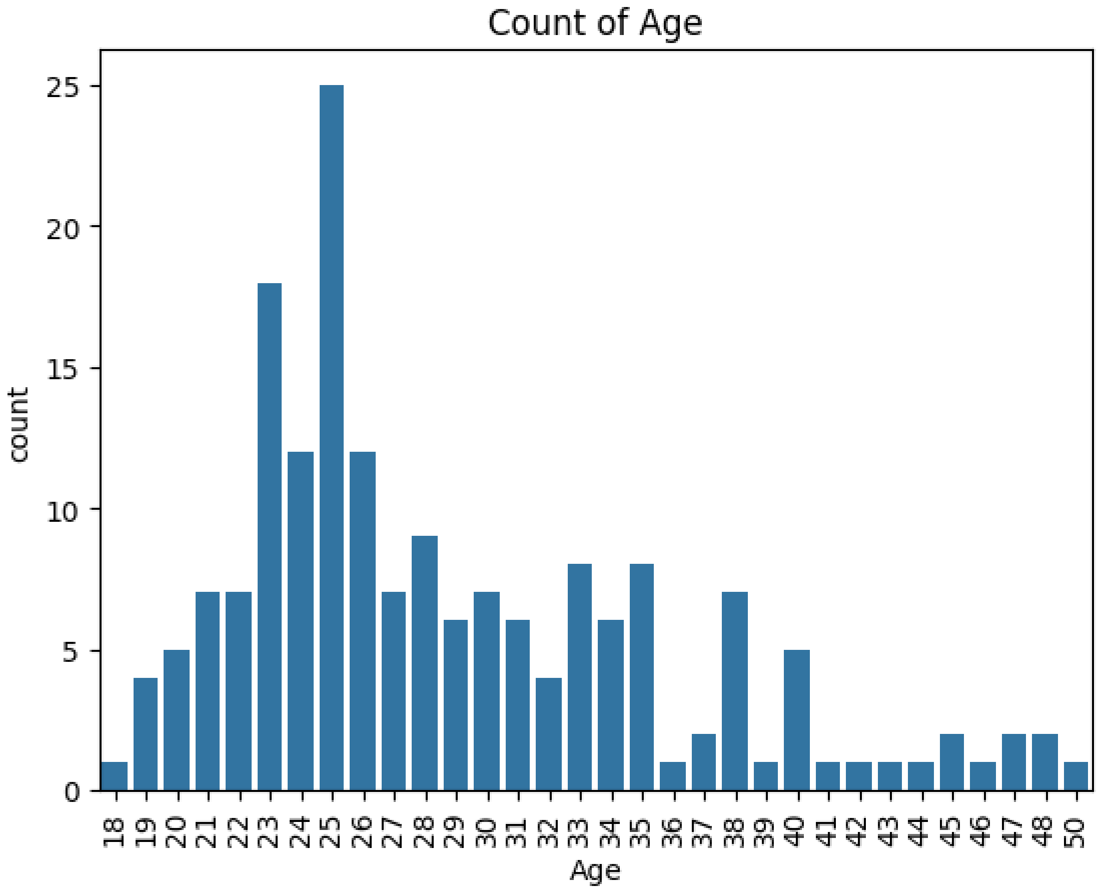
Univariate Graphs

In [30]:

```
#Age
sns.histplot(data['Age'])
plt.title('Distribution of Age')
plt.show()

sns.countplot(x='Age', data=data)
```

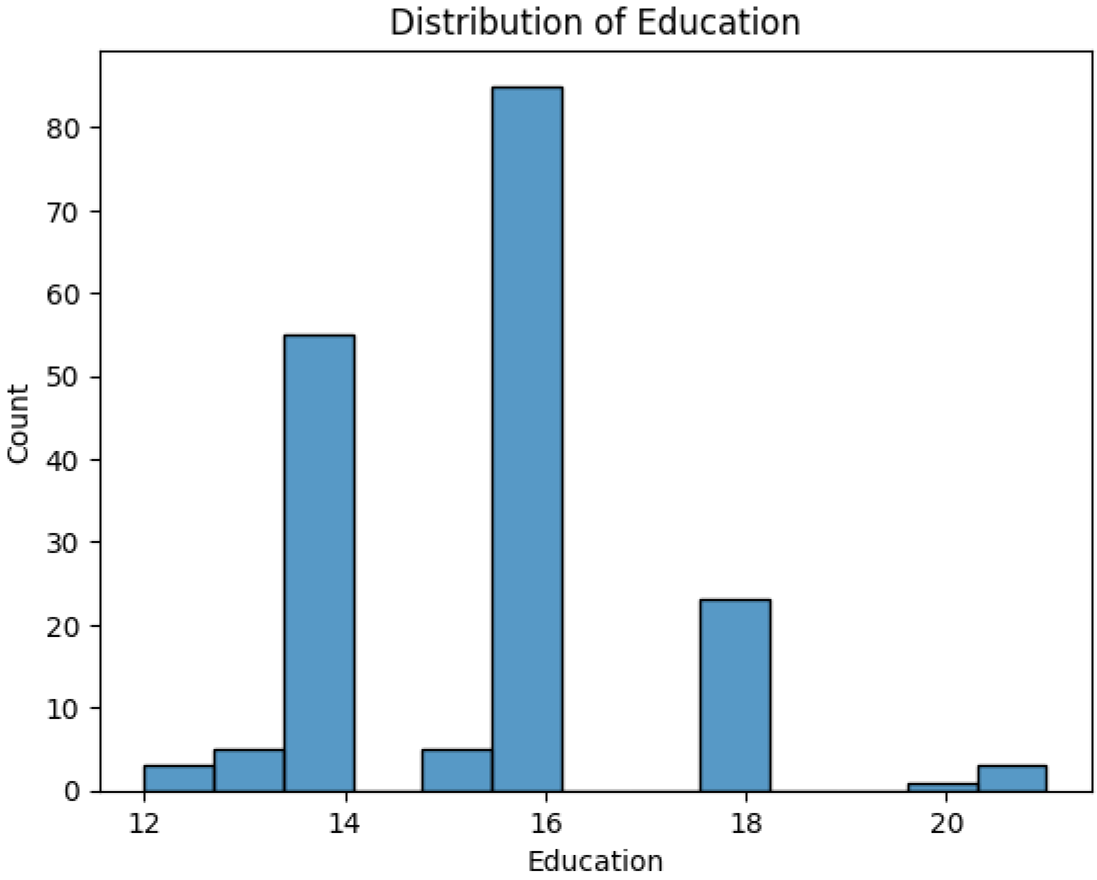
```
plt.title('Count of Age')
plt.xticks(rotation=90)
plt.show()
```

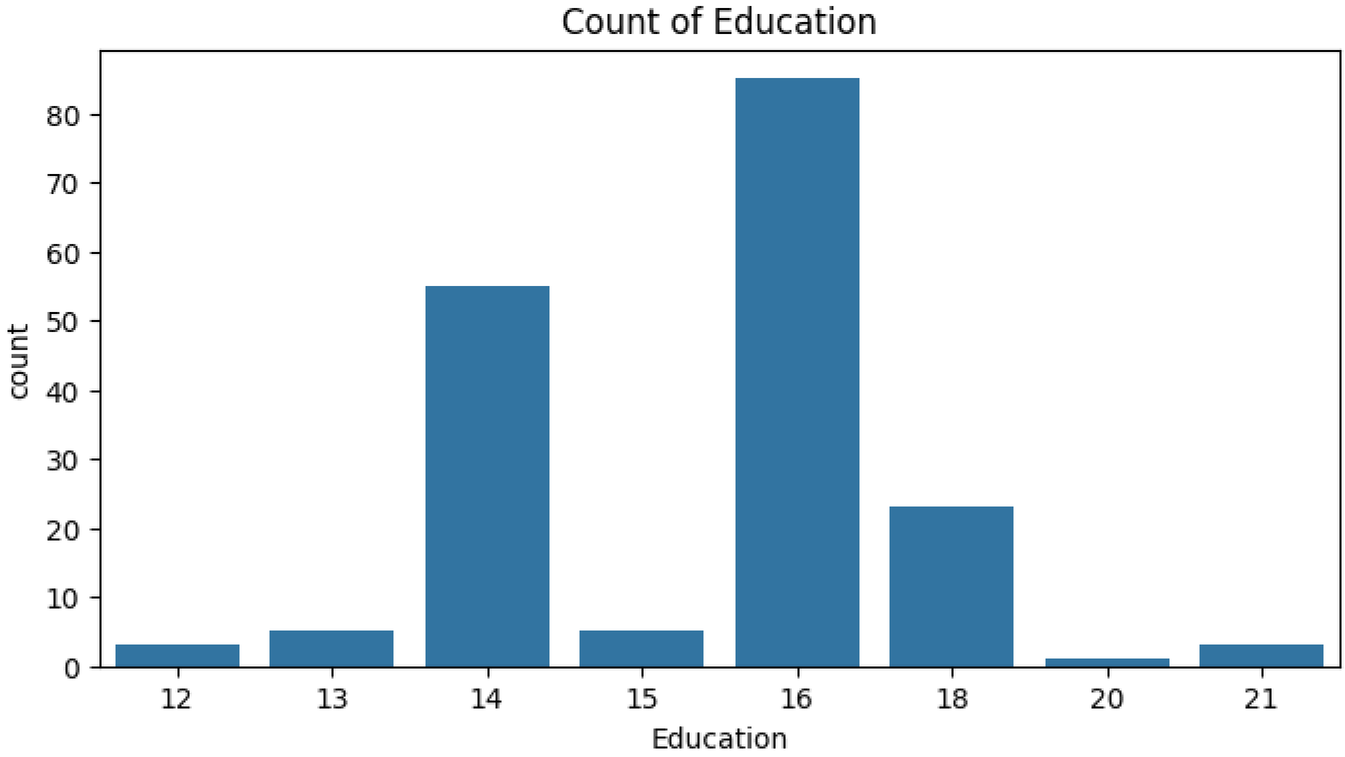




In [31]:

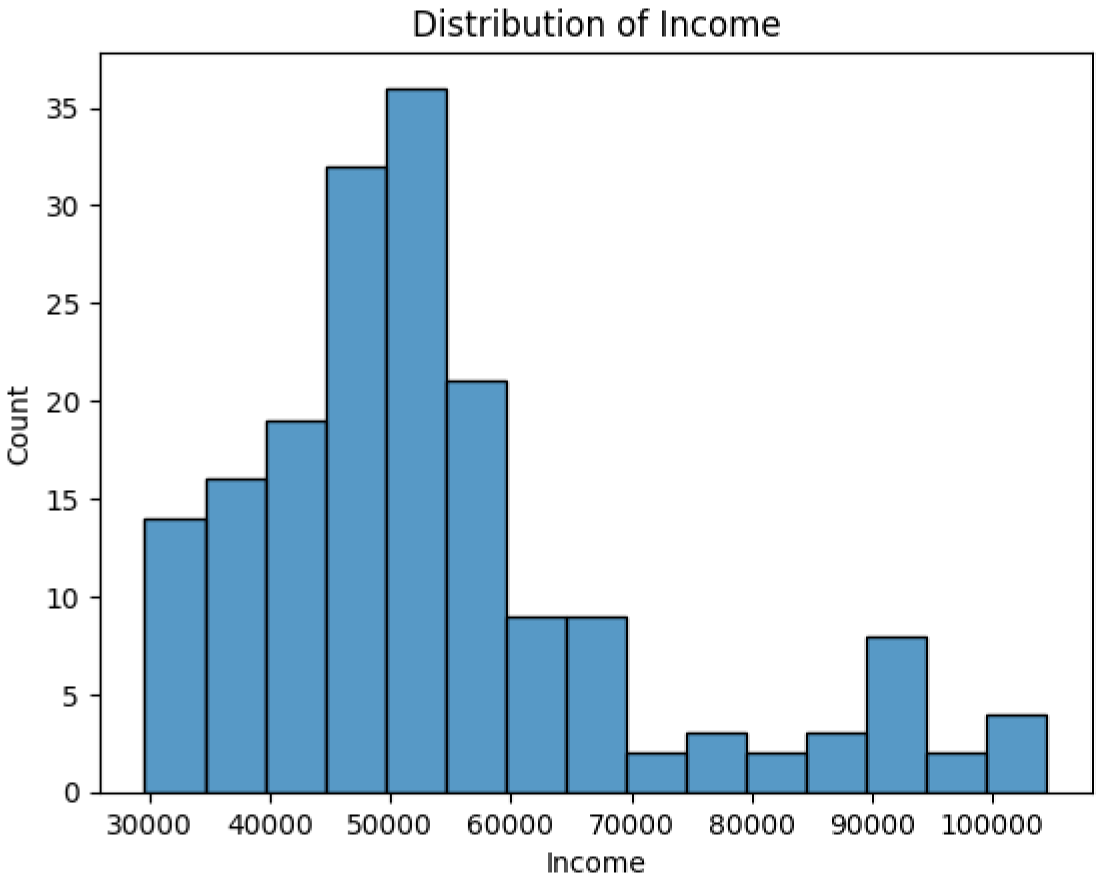
```
# Education
sns.histplot(data['Education'])
plt.title('Distribution of Education')
plt.show()

plt.figure(figsize=(8, 4))
sns.countplot(x='Education', data=data)
plt.title('Count of Education')
plt.show()
```

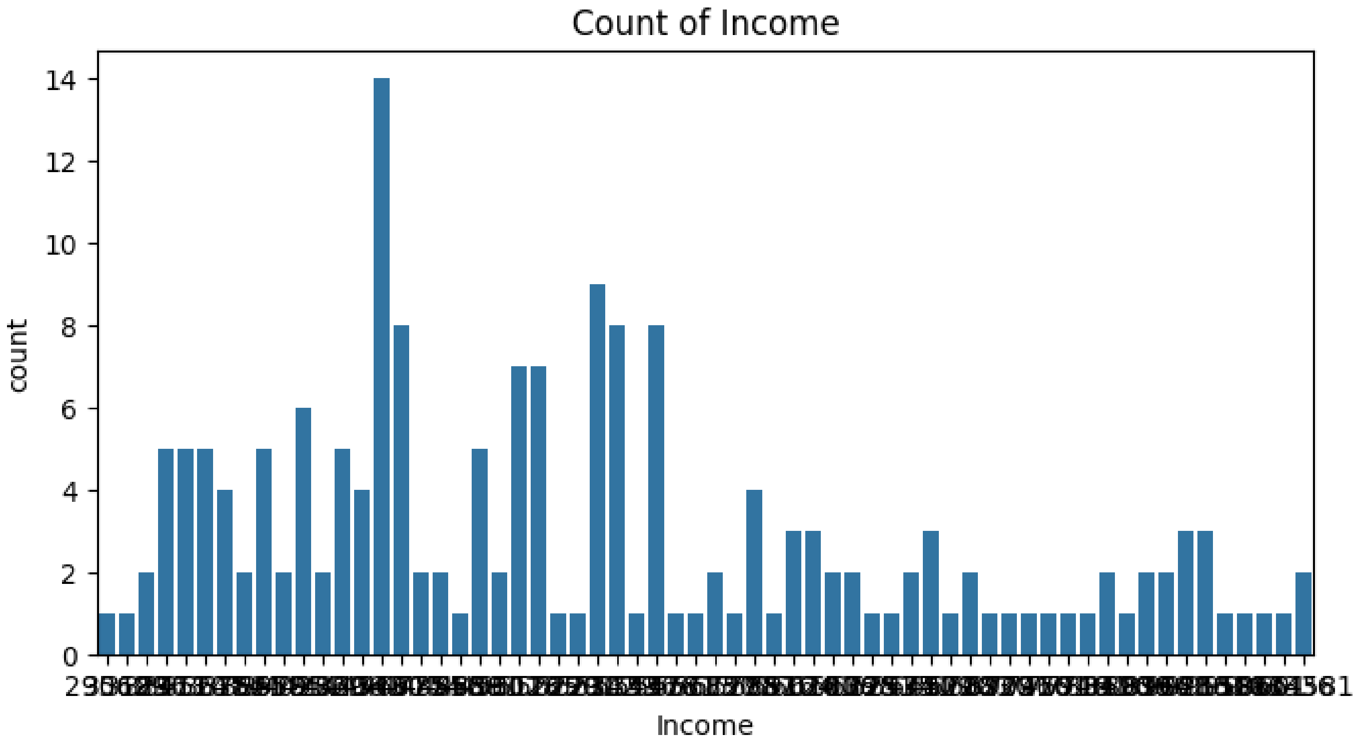




In [32]:

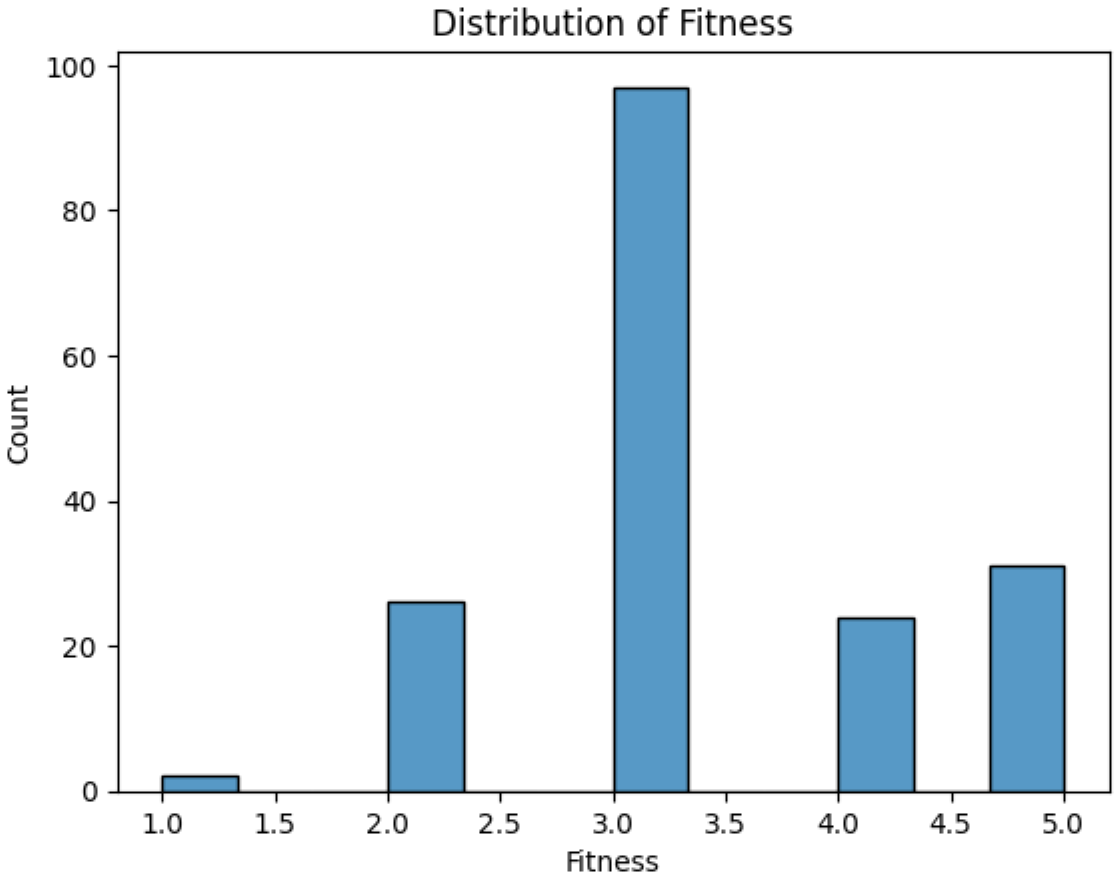
```
# Income
sns.histplot(data['Income'])
plt.title('Distribution of Income')
plt.show()
plt.figure(figsize=(8, 4))
sns.countplot(x='Income', data=data)
plt.title('Count of Income')
plt.show()
```

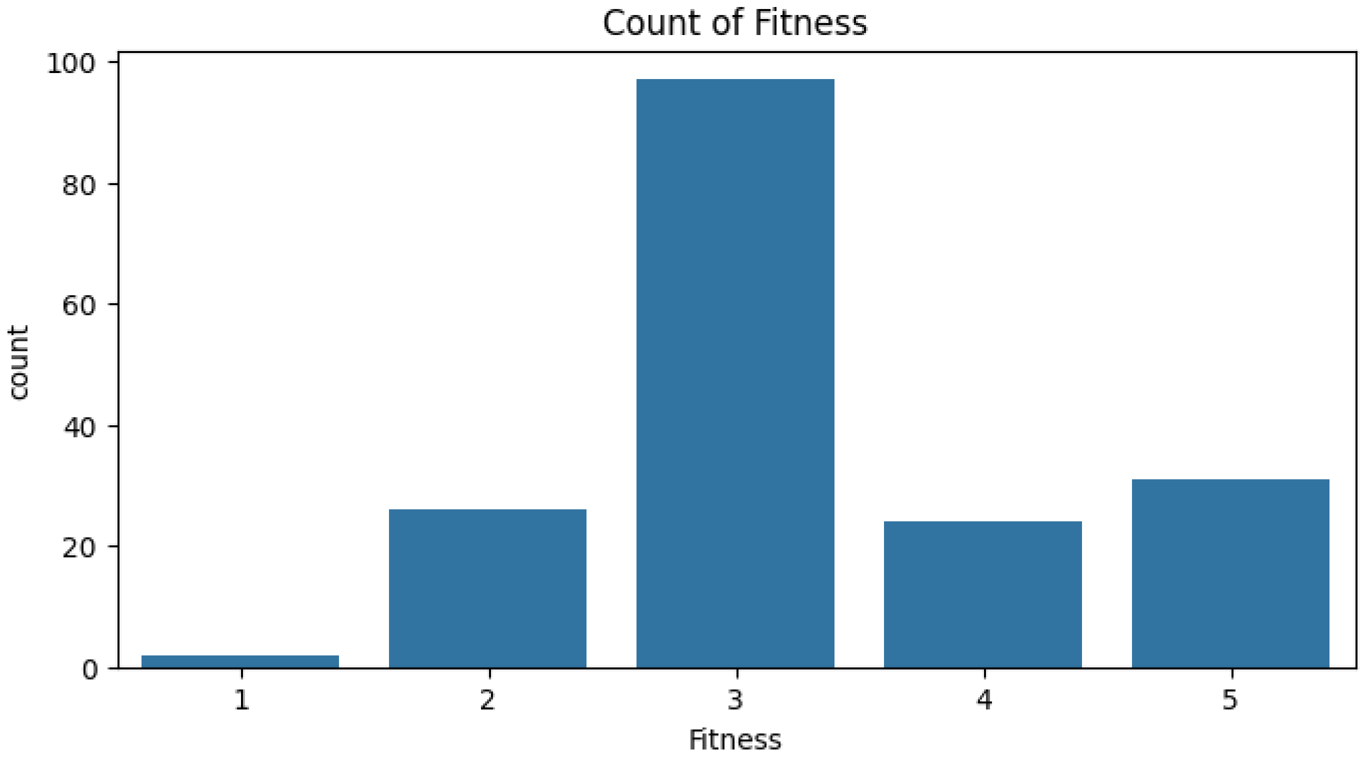




In [33]:
```
# Fitness
sns.histplot(data['Fitness'])
plt.title('Distribution of Fitness')
plt.show()

plt.figure(figsize=(8, 4))
```

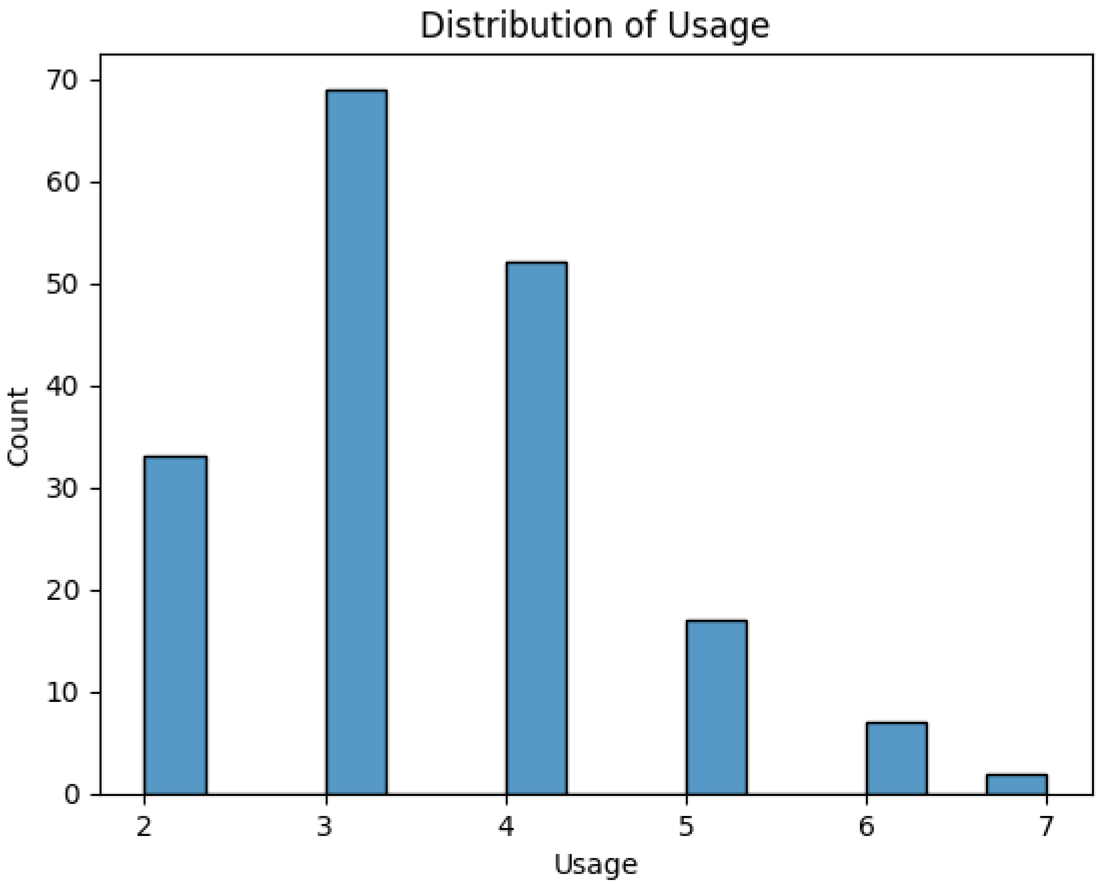
```
sns.countplot(x='Fitness', data=data)
plt.title('Count of Fitness')
plt.show()
```



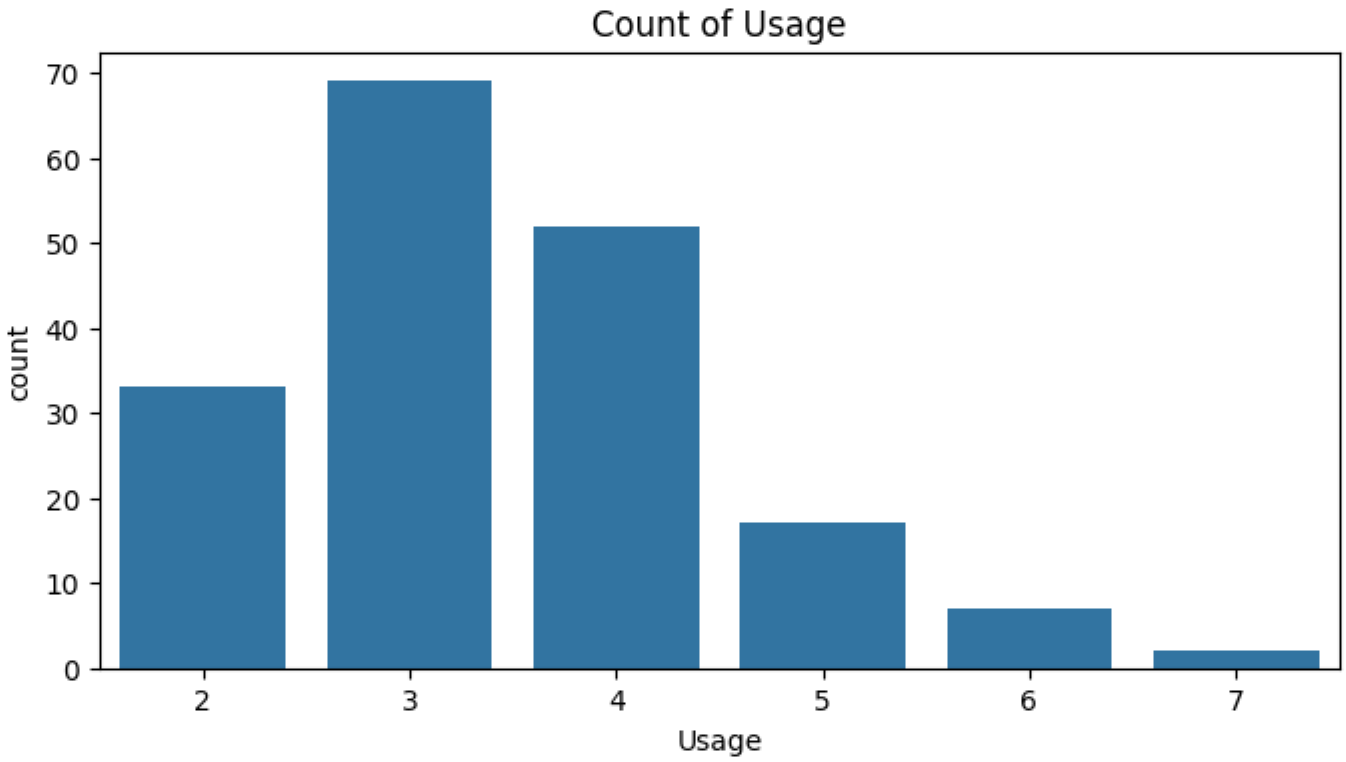


In [34]:
```
# Usage
sns.histplot(data['Usage'])
plt.title('Distribution of Usage')
plt.show()

plt.figure(figsize=(8, 4))
sns.countplot(x='Usage', data=data)
```

```python
plt.title('Count of Usage')
plt.show()
```



Distribution of Usage

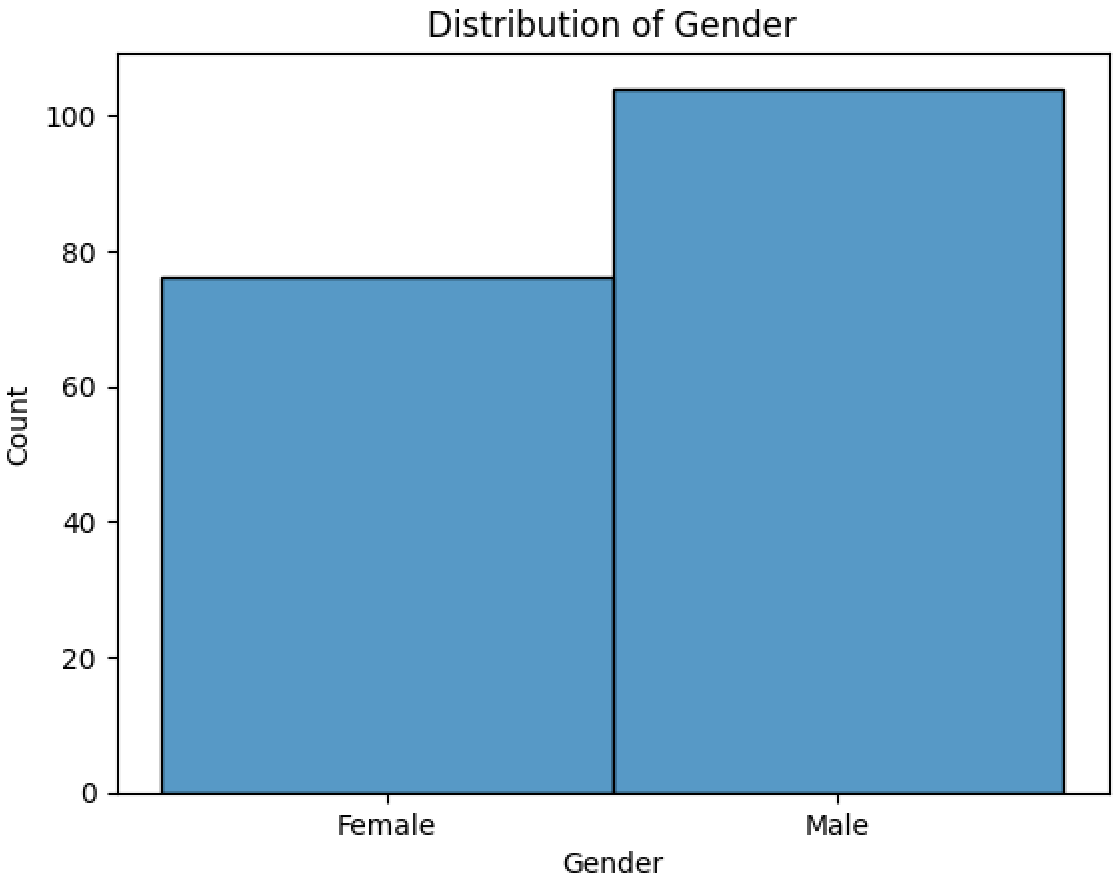


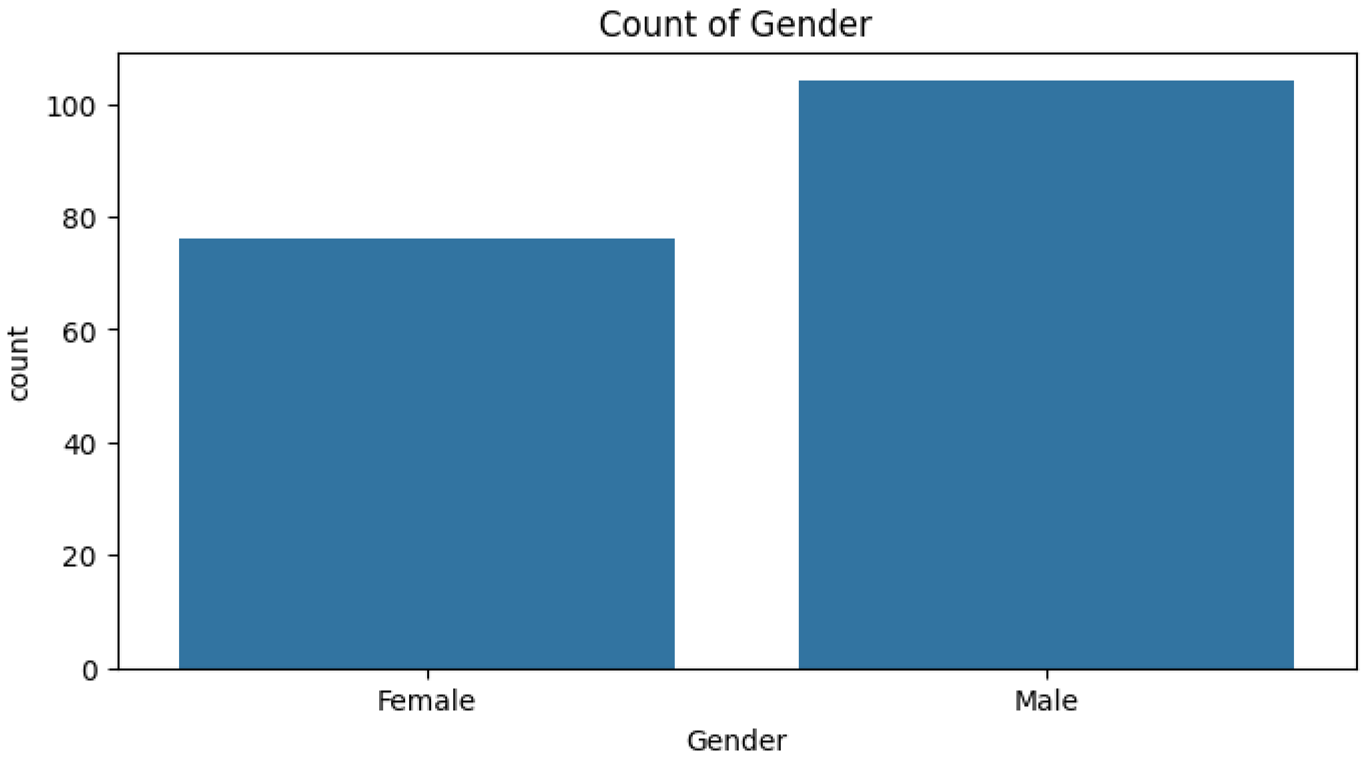
Count of Usage

In [35]:

```python
# Gender
sns.histplot(data['Gender'])
plt.title('Distribution of Gender')
plt.show()

plt.figure(figsize=(8, 4))
sns.countplot(x='Gender', data=data)
```

```
plt.title('Count of Gender')
plt.show()
```





Bivariate Analysis

In [45]:

```
# Average usage of each product type by the customer
data.groupby('Product')['Usage'].mean()
```

Out[45]:

```
Product
```

```
KP281    3.087500
KP481    3.066667
KP781    4.775000
Name: Usage, dtype: float64
```

In [47]:

```
# Average Age of customer using each product
data.groupby('Product')['Age'].mean()
```

Out[47]:

```
Product
KP281    28.55
KP481    28.90
KP781    29.10
Name: Age, dtype: float64
```

In [48]:

```
# Average Education of customer using each product Average Education of customer using e
data.groupby('Product')['Education'].mean()
```

Out[48]:

```
Product
KP281    15.037500
KP481    15.116667
KP781    17.325000
Name: Education, dtype: float64
```

In [50]:

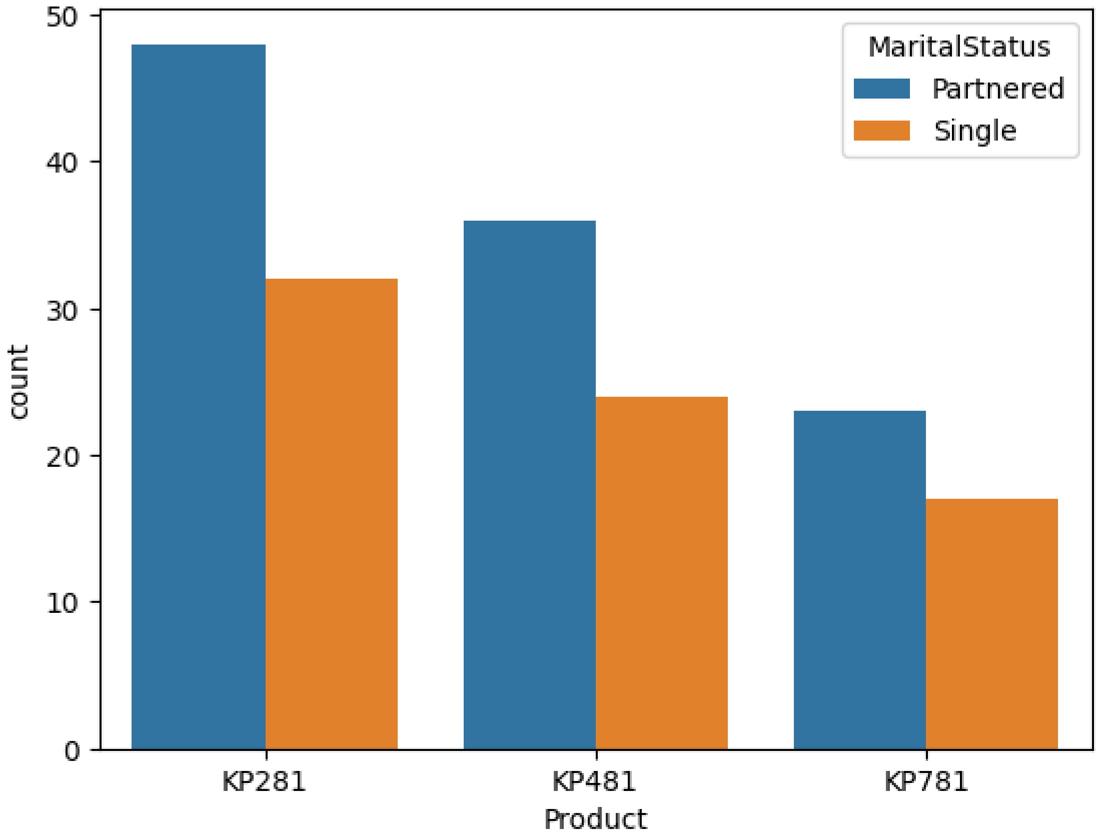
```
# Average customer fitness rating for each product type purchased
data.groupby('Product')['Fitness'].mean()
```

Out[50]:

```
Product
KP281    2.9625
KP481    2.9000
KP781    4.6250
Name: Fitness, dtype: float64
```

In [51]:

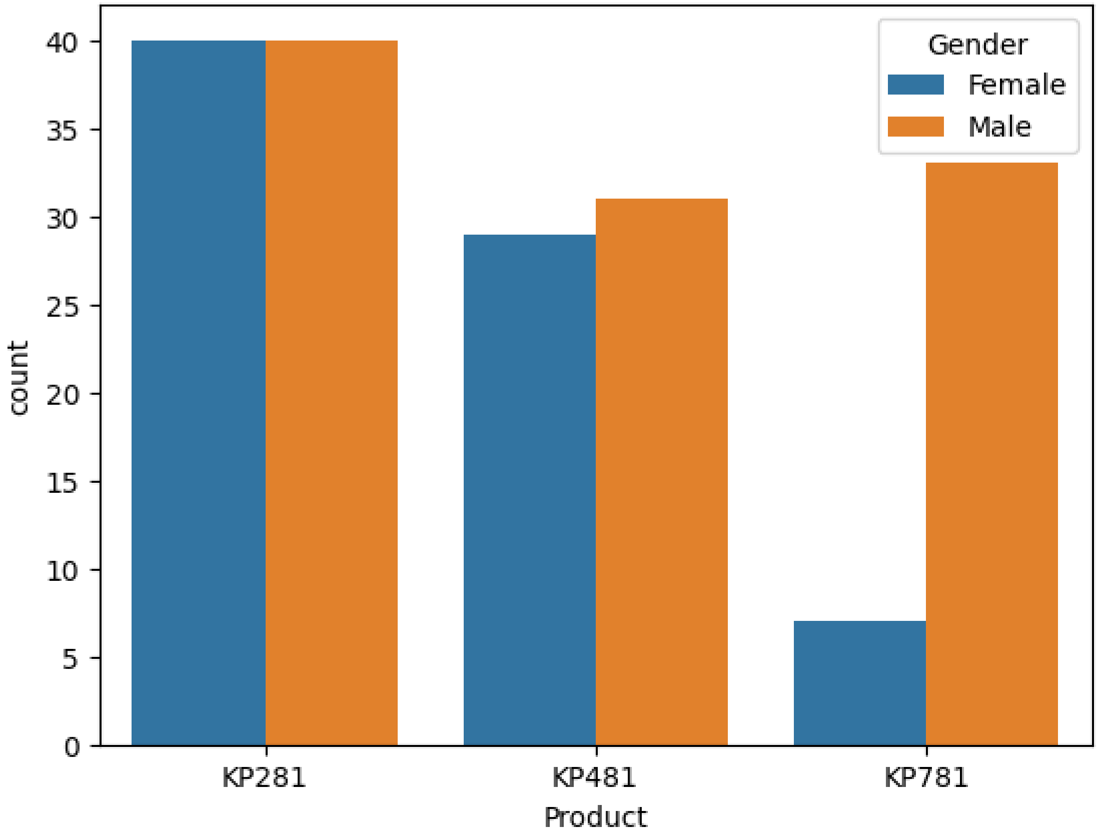
```
# Product purchased among Married/Partnered and Single
sns.countplot(data=data,x='Product',hue='MaritalStatus')
plt.show()
```



In [52]:

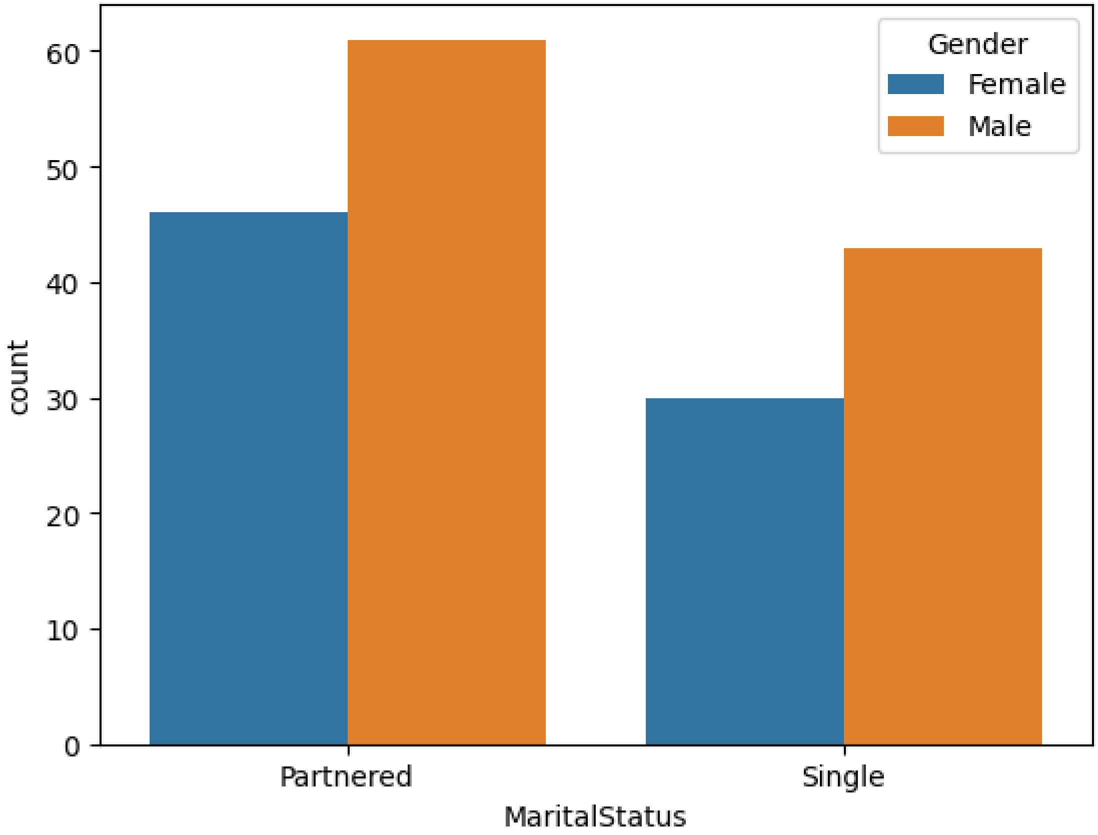
```
# Product purchased among Male and Female
sns.countplot(data=data,x='Product',hue='Gender')
```

```
plt.show()
```



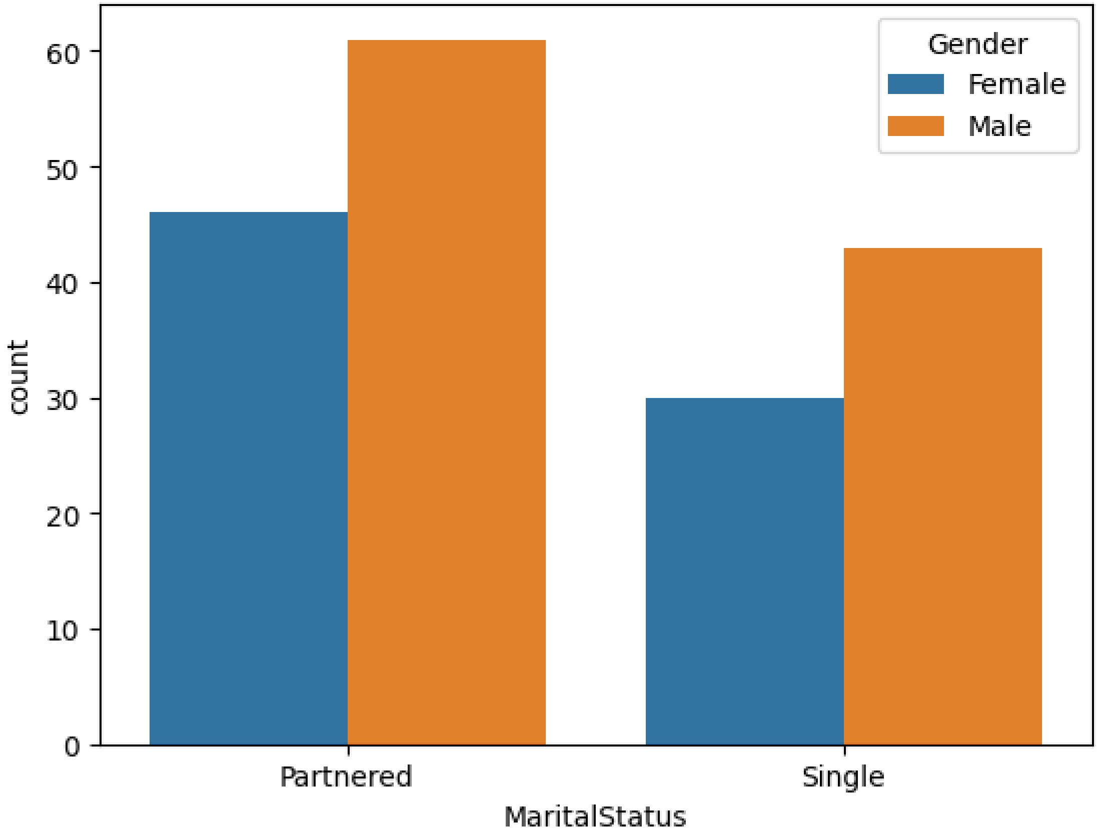
In [53]:

```
# Count among Gender and their Marital Status
sns.countplot(data=data,x='MaritalStatus',hue='Gender')
plt.show()
```



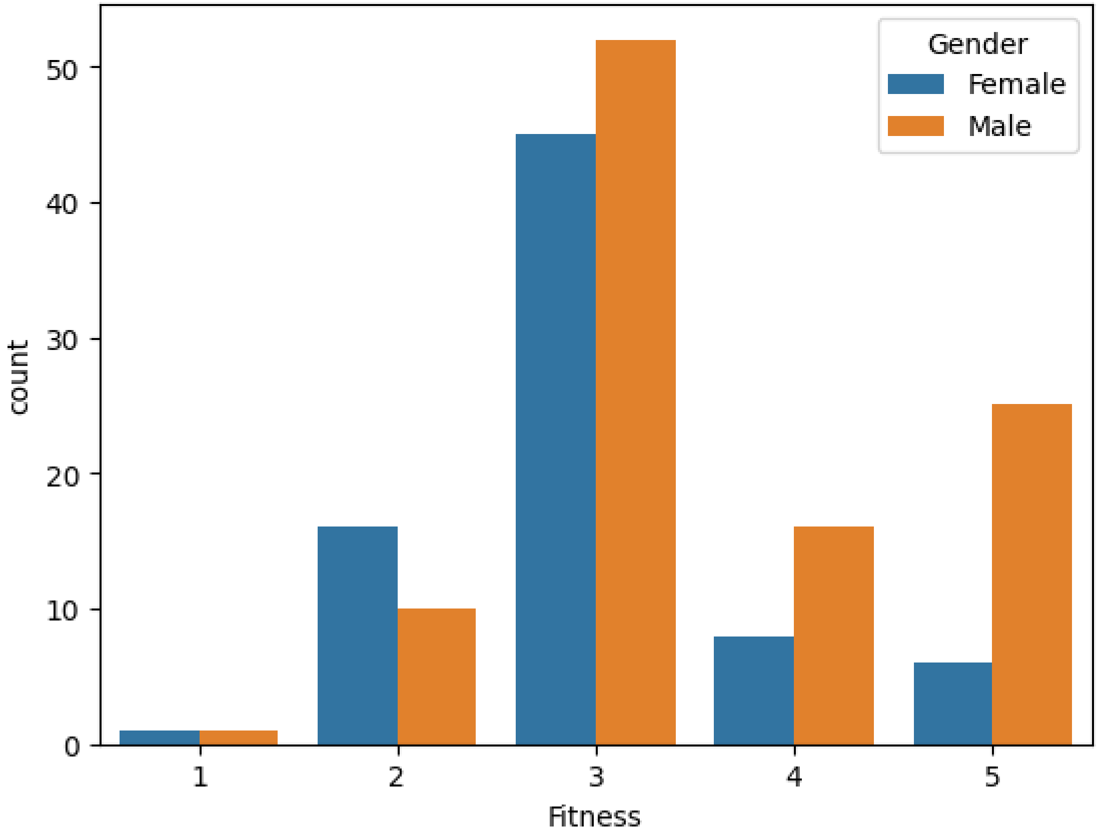
In [54]:

```
# Count among Gender and their Marital Status
sns.countplot(data=data,x='MaritalStatus',hue='Gender')
plt.show()
```



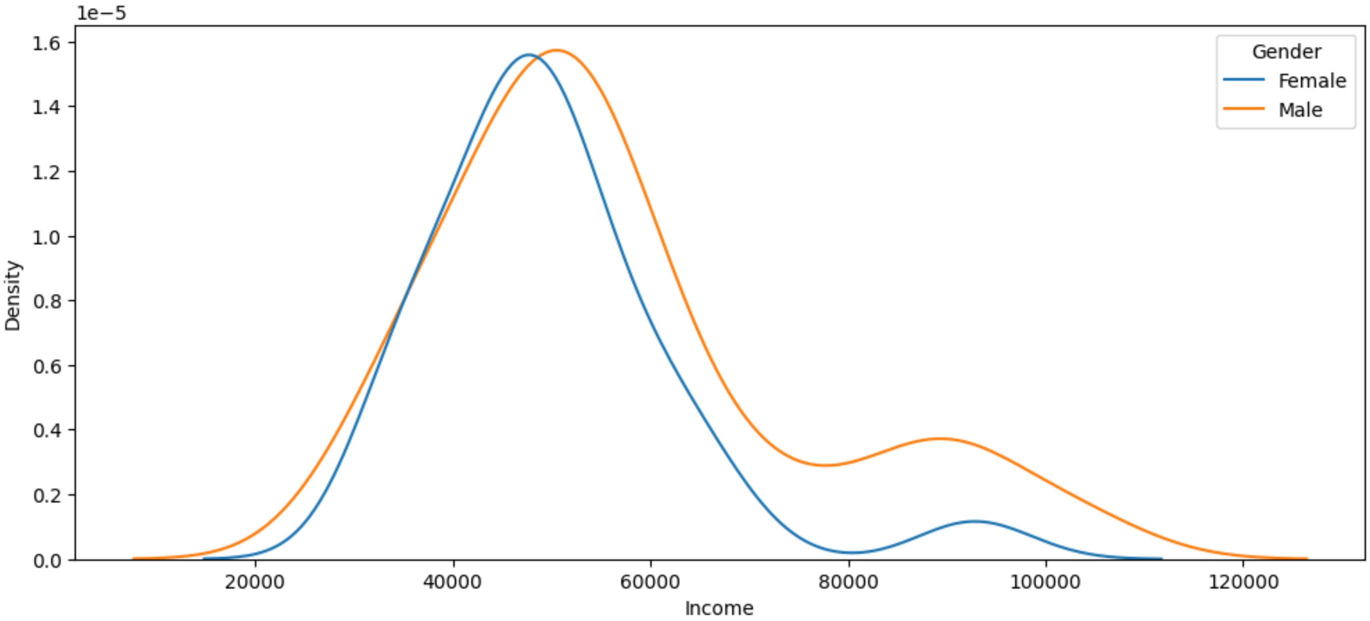
In [57]:

```python
# Fitness rating among the customers categorised by Gender
sns.countplot(data=data,x='Fitness',hue='Gender')
plt.show()
```

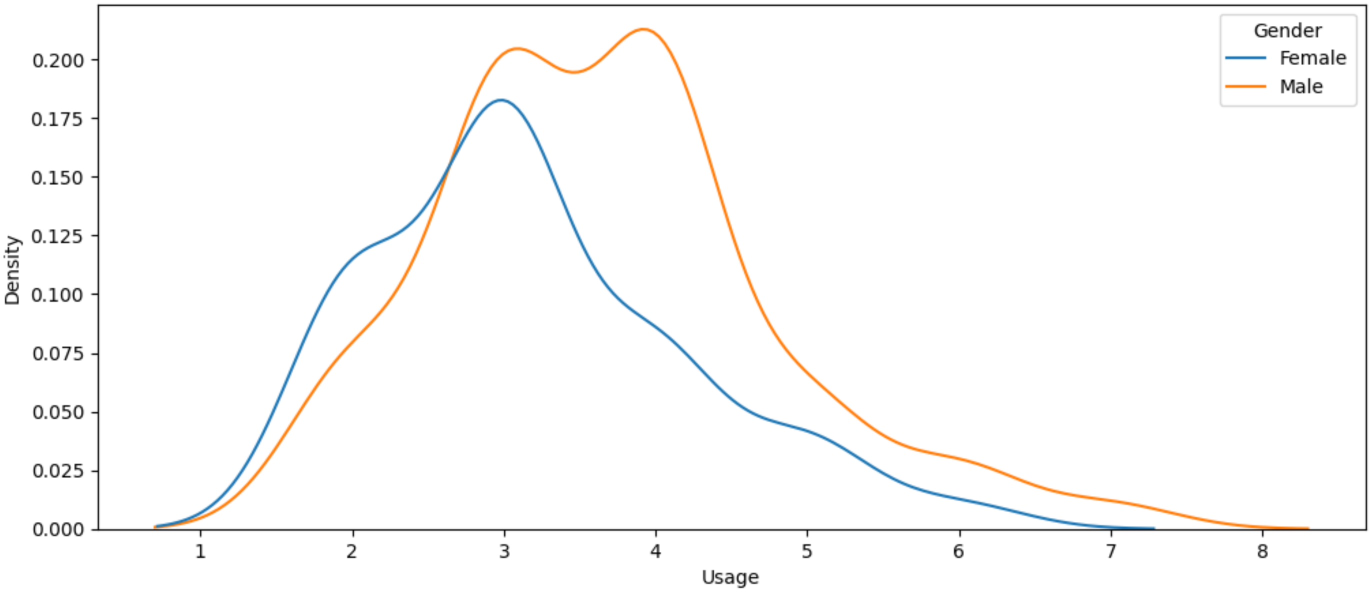


In [58]:

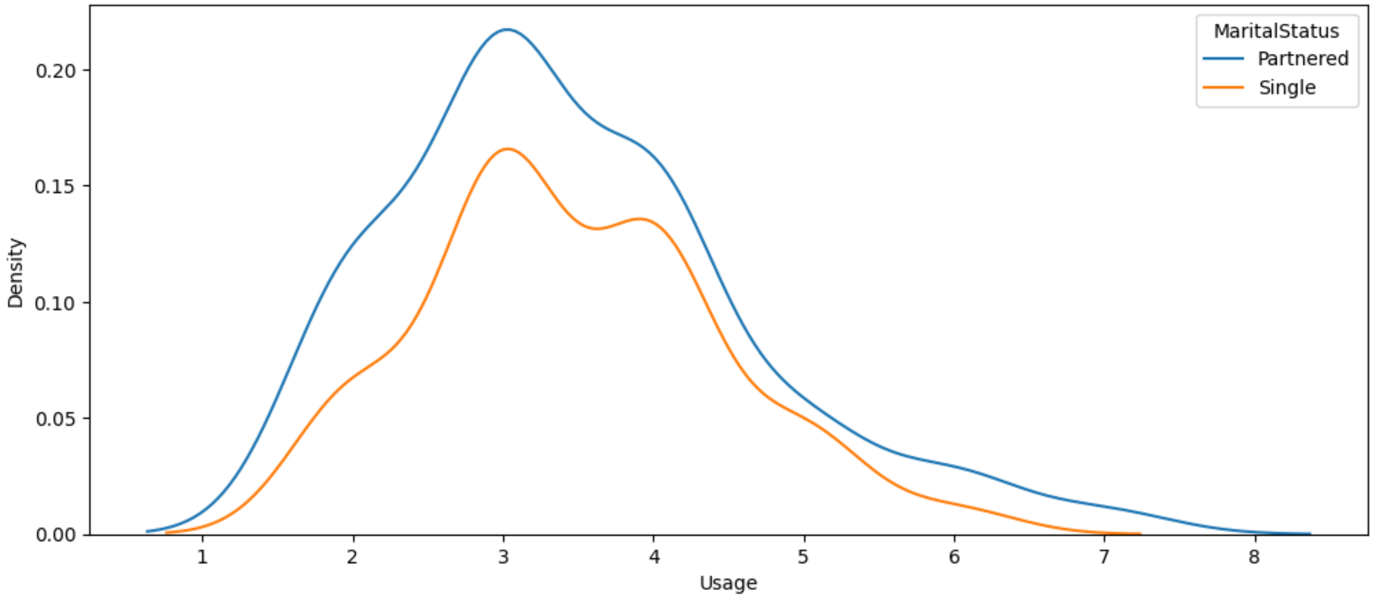
```python
# Product purchased Customers Income and their Gender
plt.figure(figsize=(12,5))
sns.kdeplot(data=data,x='Income',hue='Gender')
plt.show()
```



In [59]:
```
# Product purchased Customers Usage per week and their Gender
plt.figure(figsize=(12,5))
sns.kdeplot(data=data,x='Usage',hue='Gender')
plt.show()
```

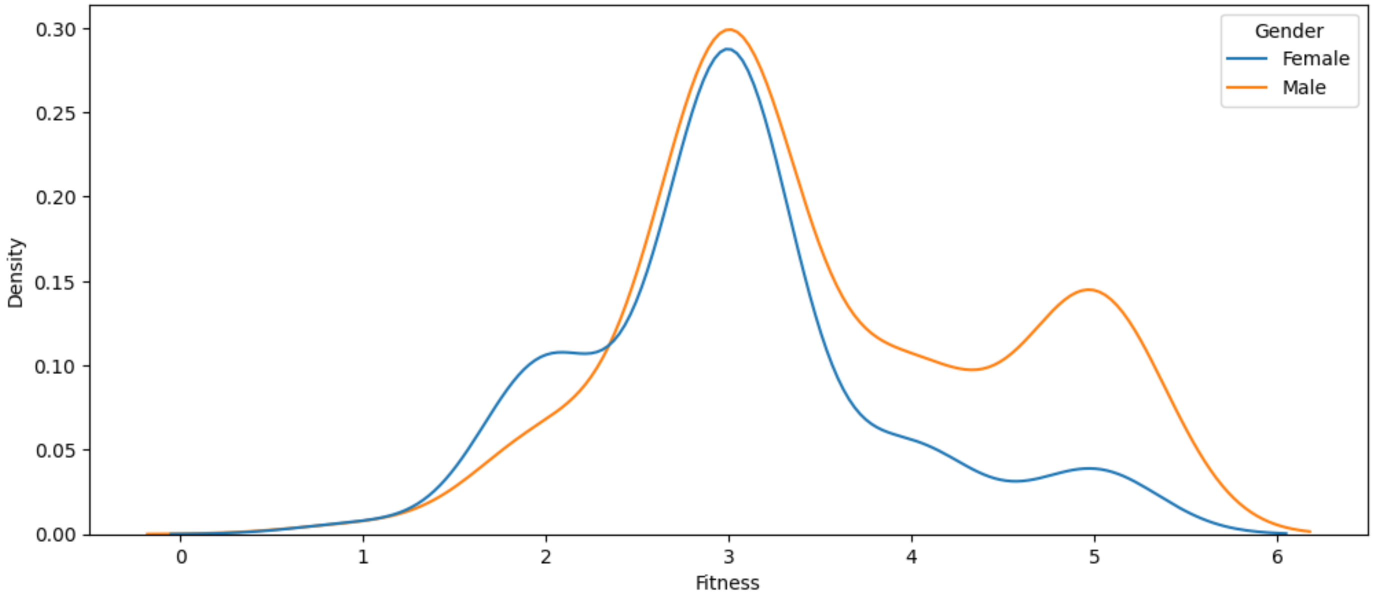


In [60]:
```
# Product purchased Customers Usage per week and their Marital Status
plt.figure(figsize=(12,5))
sns.kdeplot(data=data,x='Usage',hue='MaritalStatus')
plt.show()
```



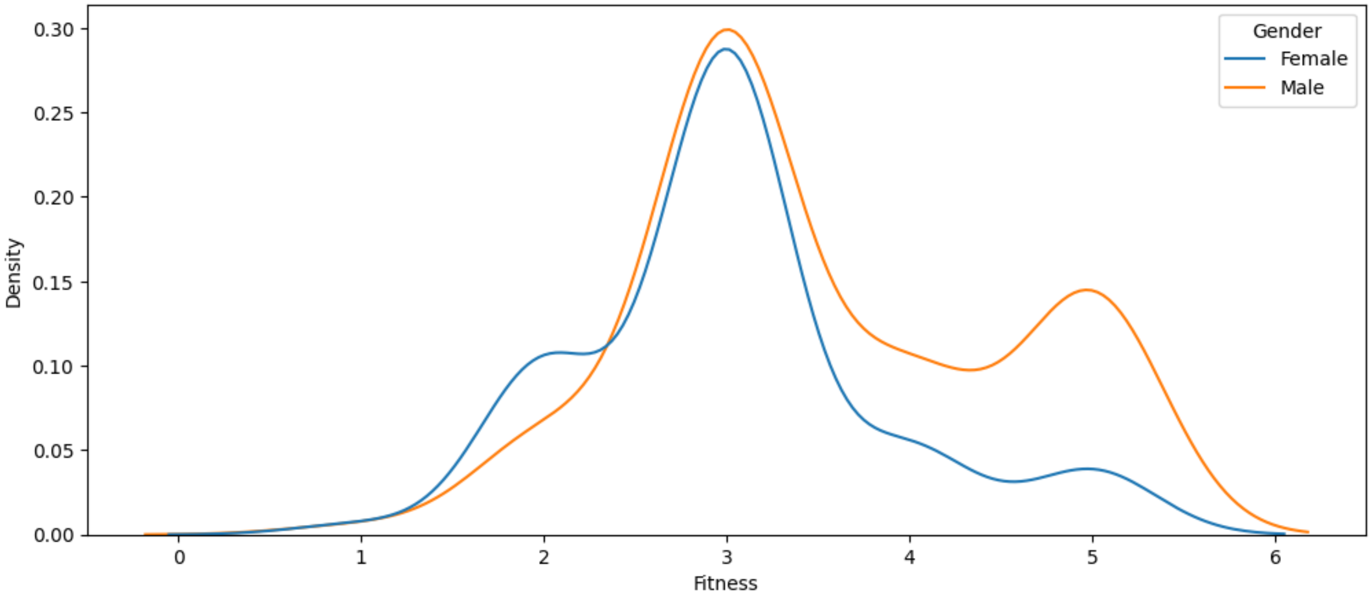
In [61]:

```
# Product purchased Customers Fitness Rating and their Gender
plt.figure(figsize=(12,5))
sns.kdeplot(data=data,x='Fitness',hue='Gender')
plt.show()
```



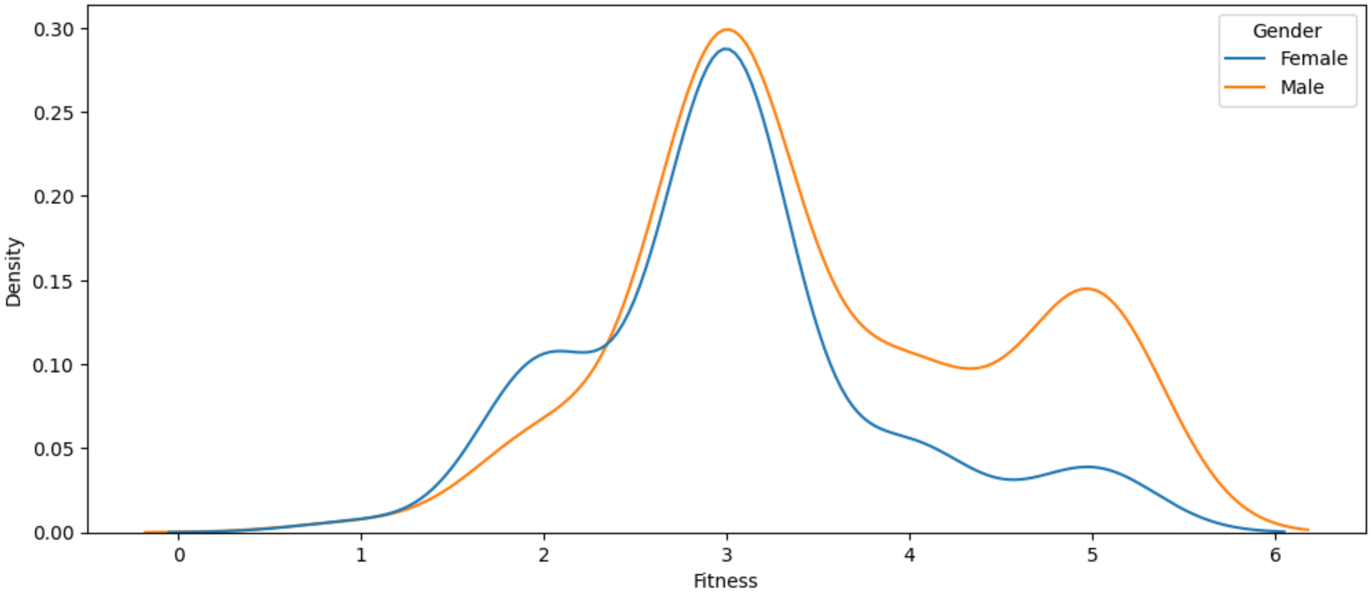
In [62]:

```
# Product purchased Customers Fitness Rating and their Gender
plt.figure(figsize=(12,5))
sns.kdeplot(data=data,x='Fitness',hue='Gender')
plt.show()
```



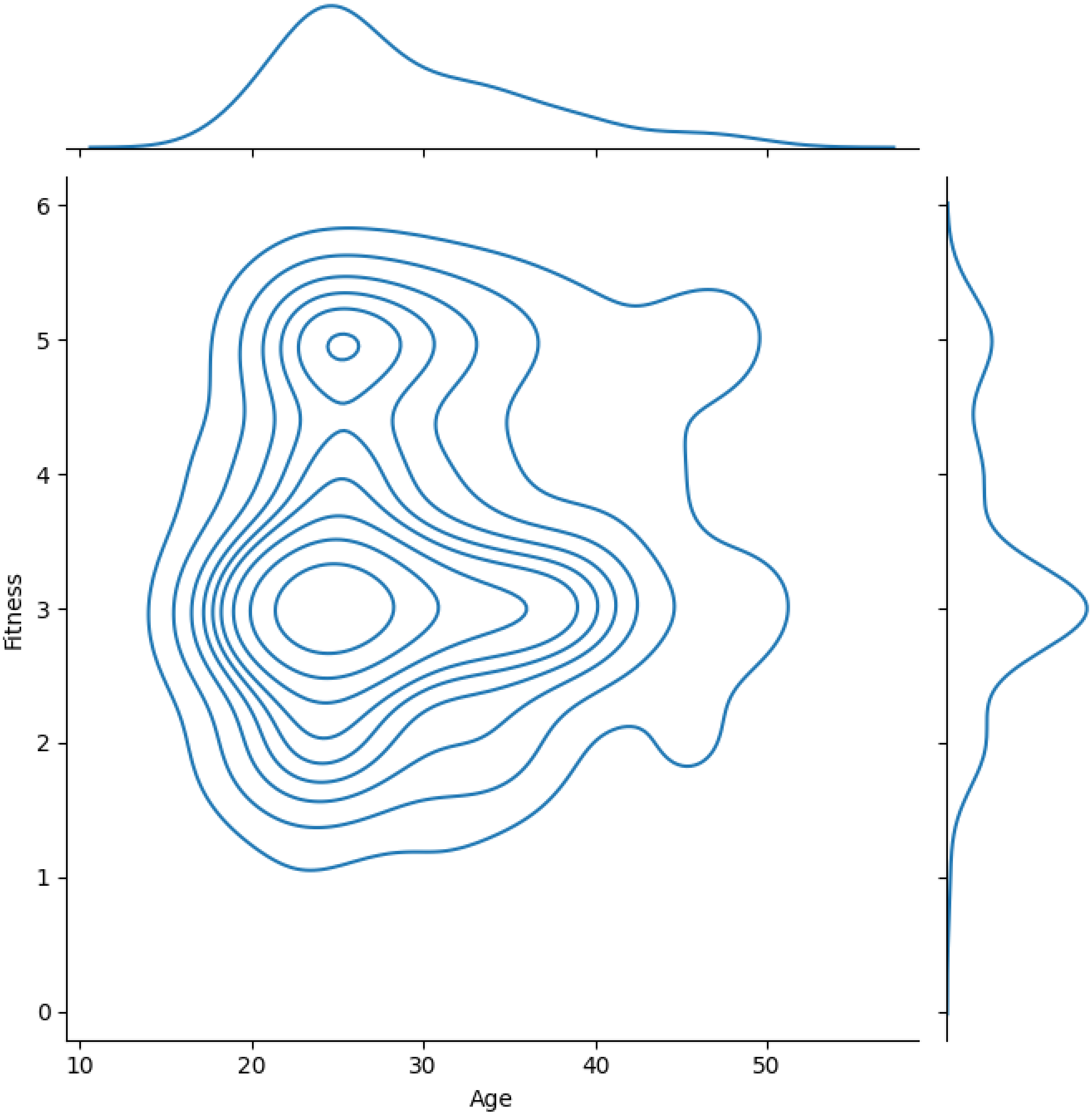
In [63]:

```
# Product purchased Customers Fitness Rating and their Gender
plt.figure(figsize=(12,5))
sns.kdeplot(data=data,x='Fitness',hue='Gender')
plt.show()
```

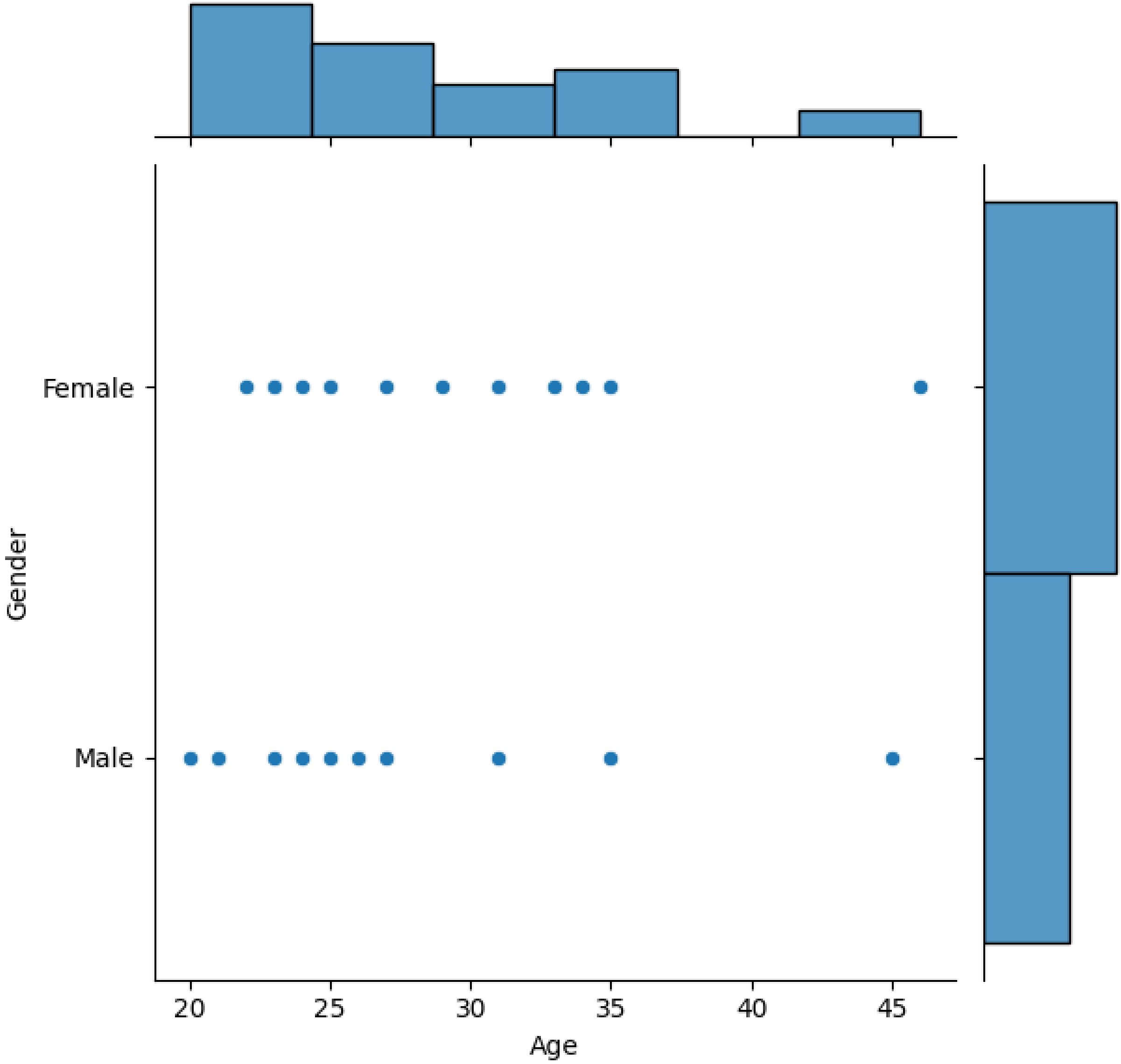


In [66]:

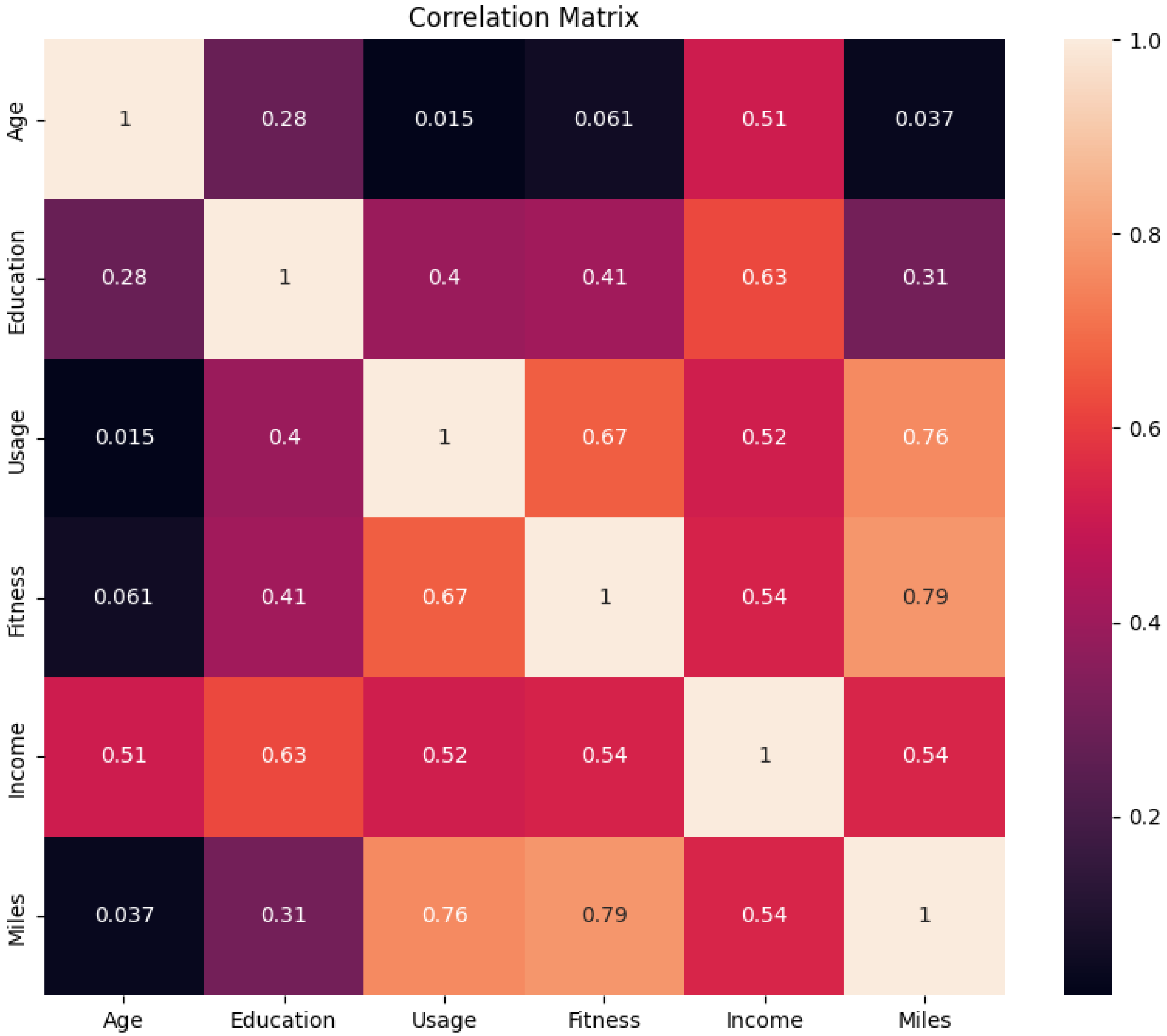
```
# Joint Histogram with KDE plot
sns.jointplot(x="Age", y="Fitness", data=data,height = 7,kind="kde")
plt.show()
```



In [65]:
```
# Scatterplot for customers Gender and Age who rated less than 2 in Fitness rating
sns.jointplot(x='Age',y='Gender',data=data[data.Fitness<3])
plt.show()
```

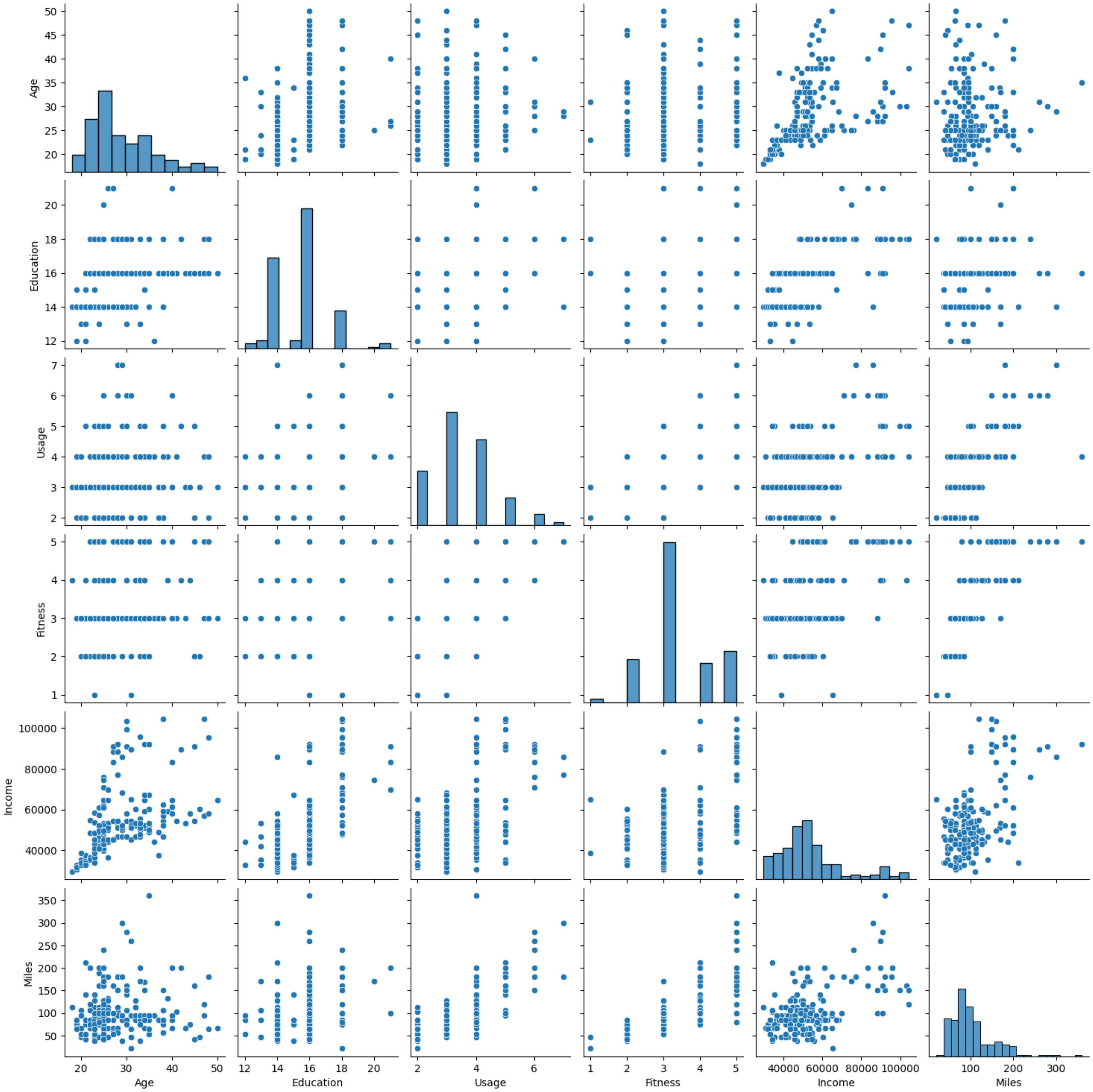


```
In [37]: # Correlation Analysis

         numeric_data = data.select_dtypes(include='number')
         plt.figure(figsize=(10, 8))
         sns.heatmap(numeric_data.corr(), annot=True)
         plt.title('Correlation Matrix')
         plt.show()
```



In [38]:

```
# Pairplots
sns.pairplot(data)
plt.show()
```

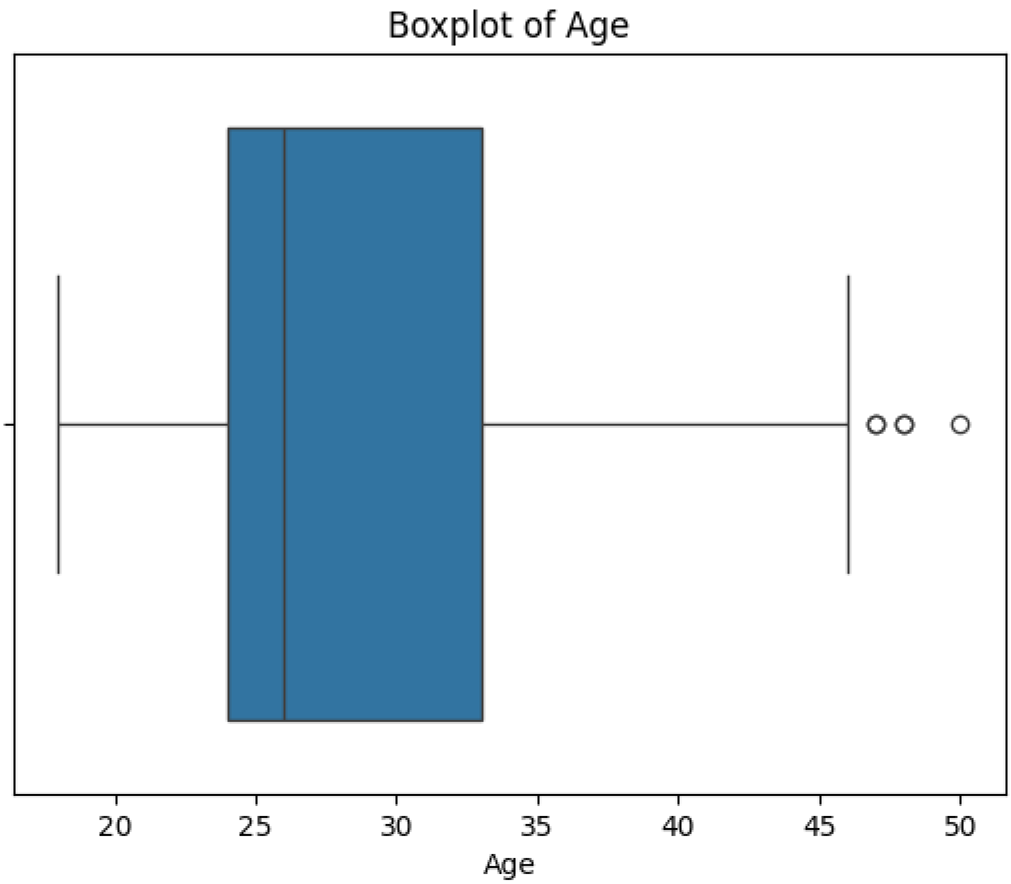


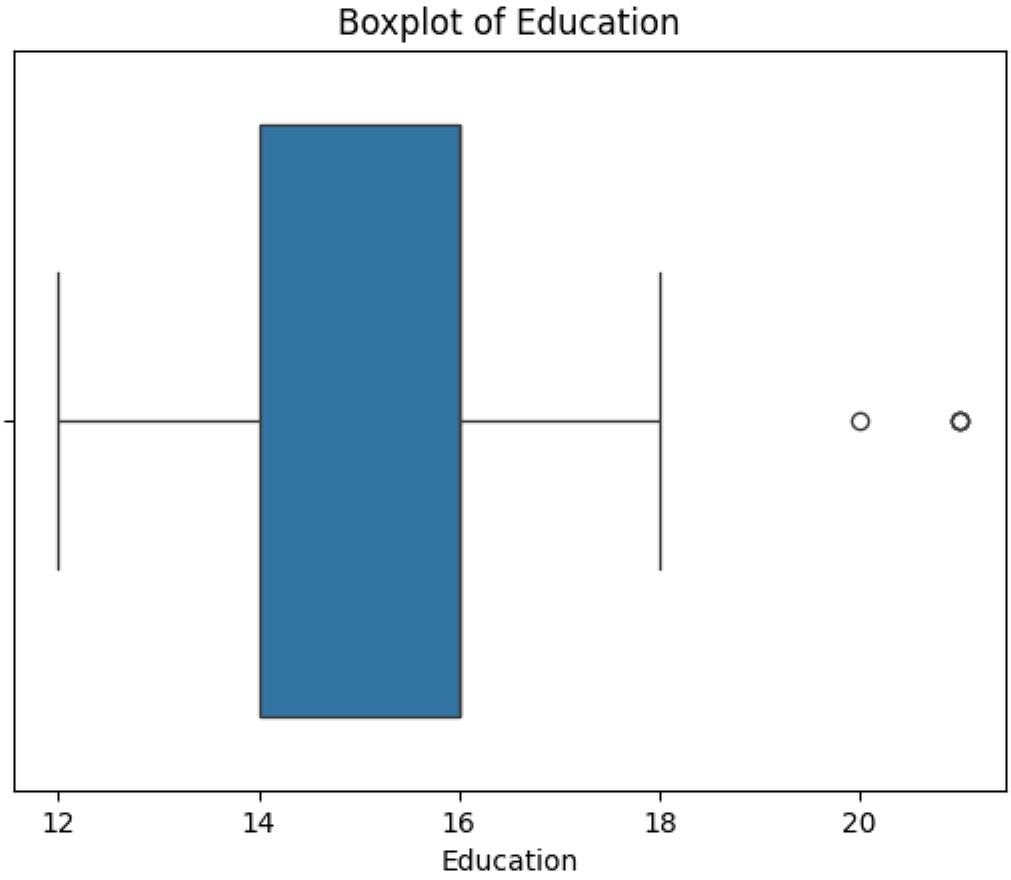
In [39]:
```
# Check for missing values

data.isnull().sum()
```

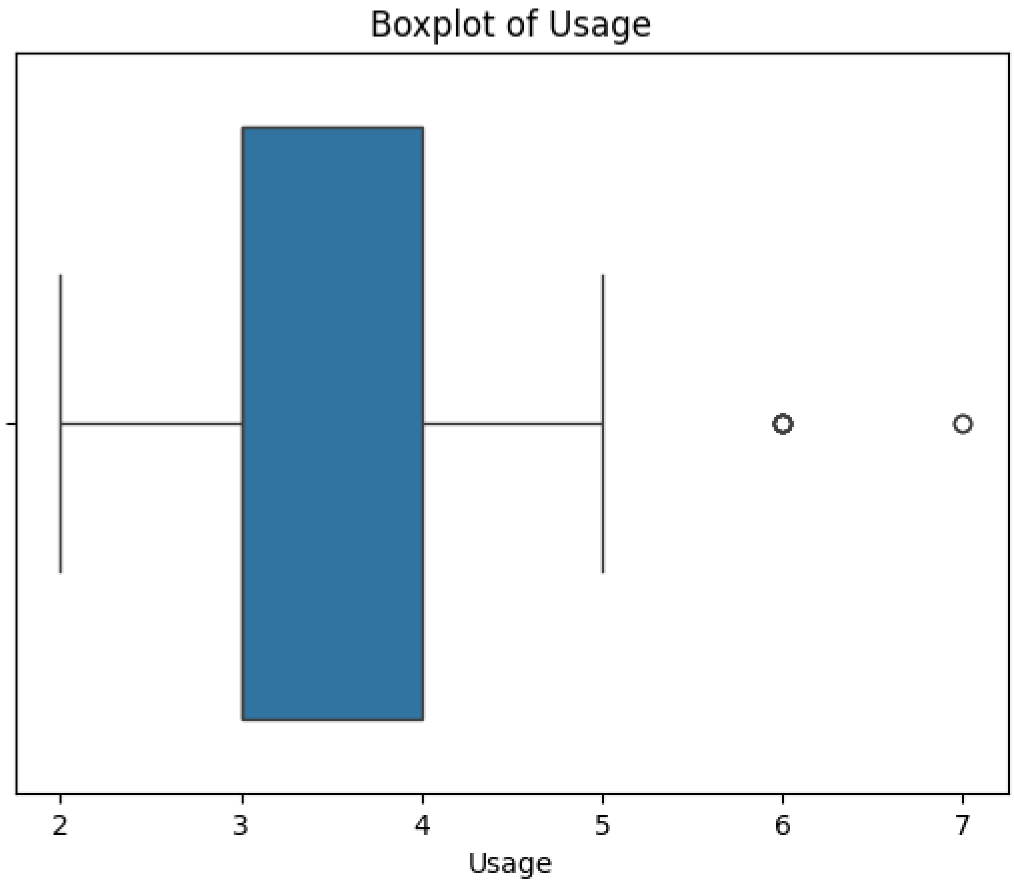
Out[39]:
```
Product          0
Age              0
Gender           0
Education        0
MaritalStatus    0
Usage            0
Fitness          0
Income           0
Miles            0
dtype: int64
```

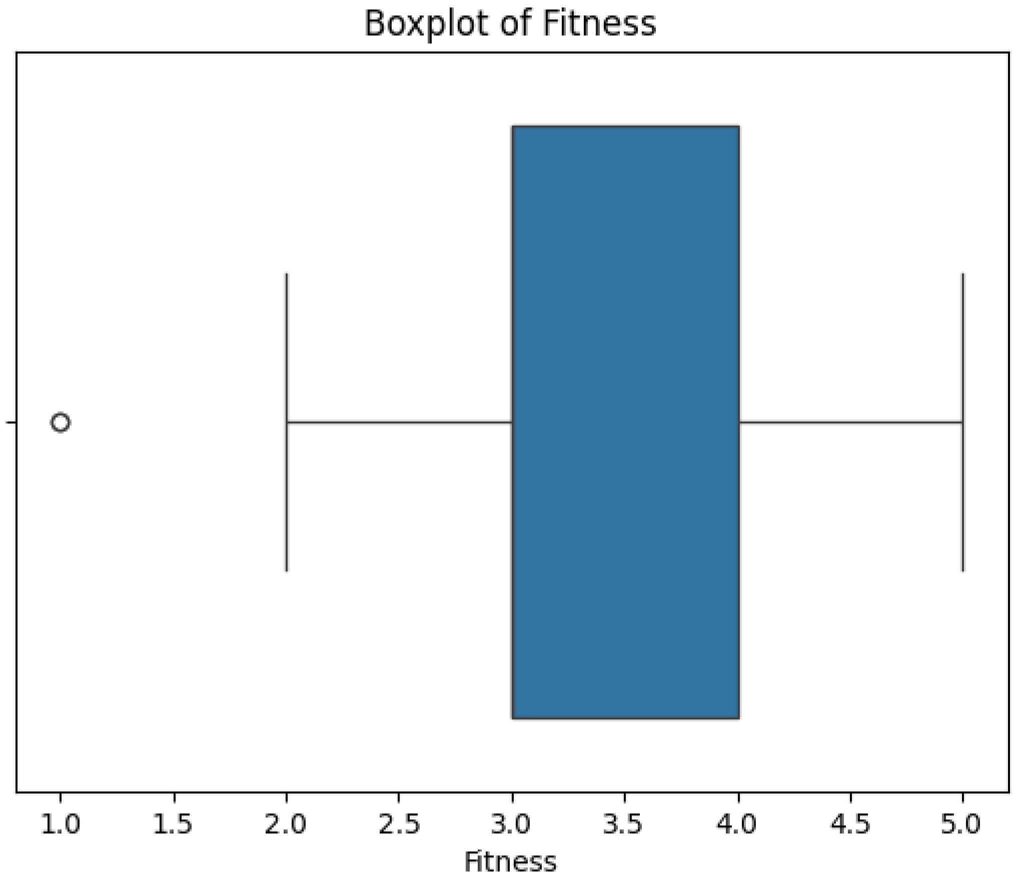
In [41]:
```
# Check for outliers

numeric_columns = data.select_dtypes(include=['int64', 'float64']).columns
for col in numeric_columns:
  plt.figure()
  sns.boxplot(x=data[col])
```

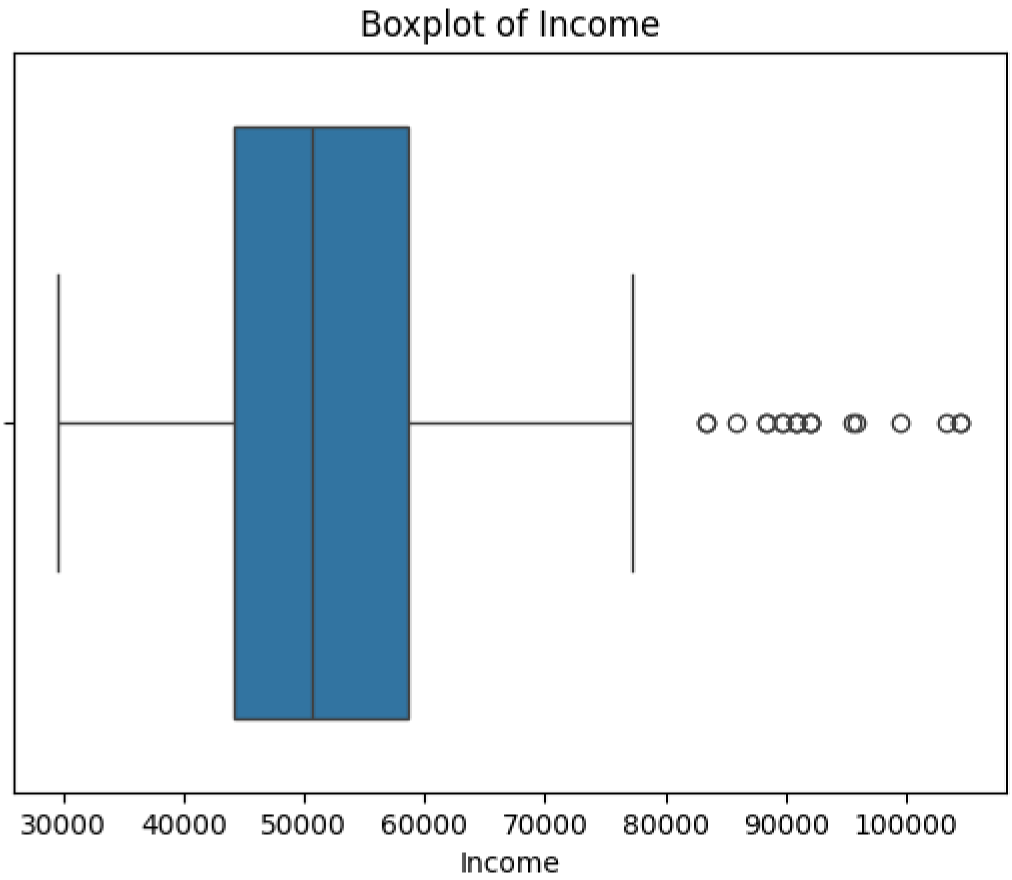
```
    plt.title(f'Boxplot of {col}')
    plt.show()
```

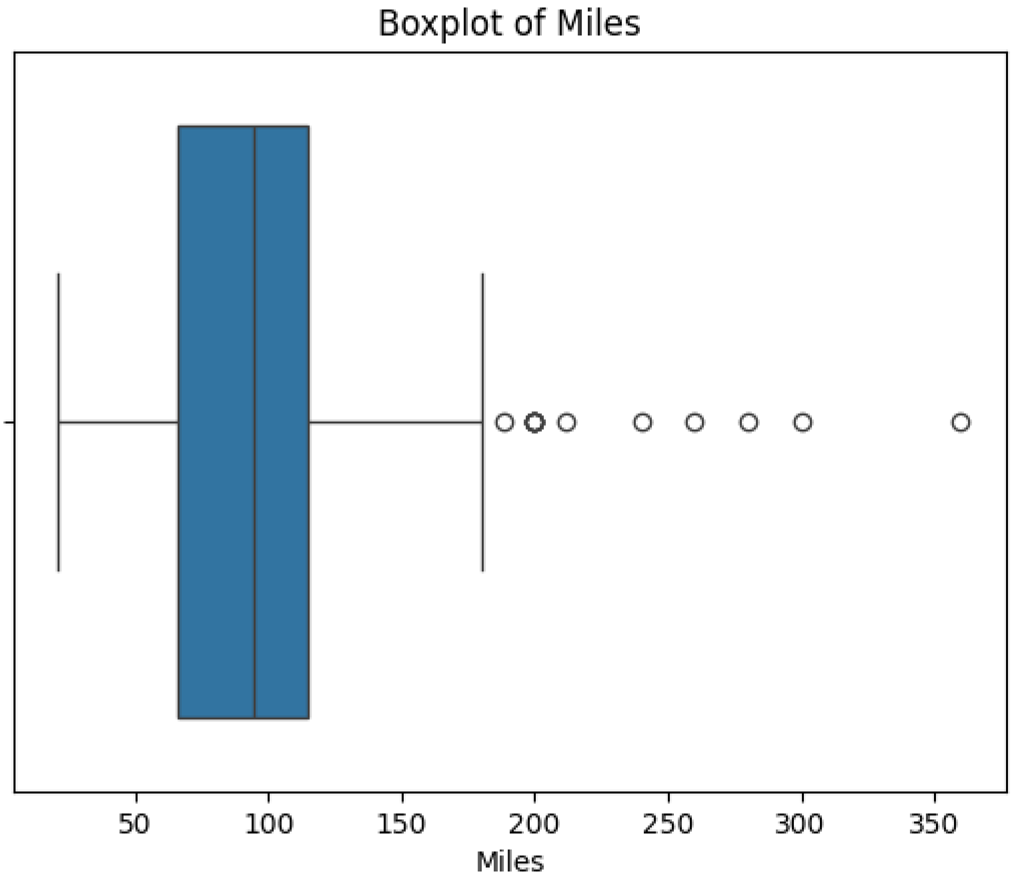





Boxplot of Usage
2
3
4
5
6
7
Usage


Boxplot of Fitness
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Fitness





Business Insights

In [67]:
```
#Probability of buying KP281, KP481 & KP781
data.Product.value_counts(normalize=True)
```

Out[67]:

```
KP281    0.444444
KP481    0.333333
KP781    0.222222
Name: Product, dtype: float64
```

In [68]:

```
#Probability by gender
data.Gender.value_counts(normalize=True)
```

Out[68]:

```
Male      0.577778
Female    0.422222
Name: Gender, dtype: float64
```

In [69]:

```
#Probability by marital status
data.MaritalStatus.value_counts(normalize=True)
```

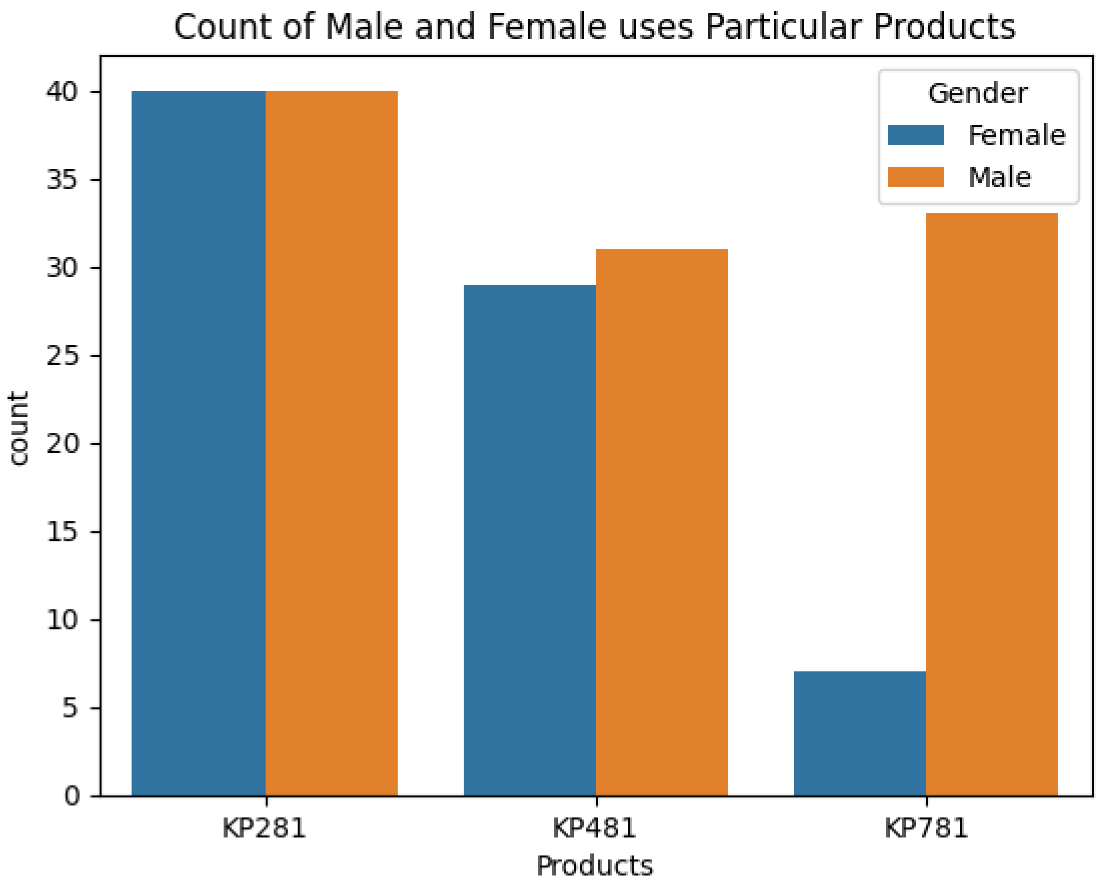
Out[69]:

```
Partnered    0.594444
Single       0.405556
Name: MaritalStatus, dtype: float64
```

Conditional and Marginal Probability

In [70]:

```
sns.countplot(x = "Product", data= data, hue = "Gender")
plt.xlabel("Products")
plt.title("Count of Male and Female uses Particular Products")
plt.show()
```



In [73]:

```
pd.crosstab([data.Product],data.Gender,margins=True)
```

Out[73]:

Gender	Female	Male	All
Product			
KP281	40	40	80
KP481	29	31	60

KP781	7	33	40
All	76	104	180

In [74]:

```
np.round(((pd.crosstab(data.Product,data.Gender,margins=True))/180)*100,2)
```

Out[74]:

Gender	**Female**	**Male**	**All**
Product			
KP281	22.22	22.22	44.44
KP481	16.11	17.22	33.33
KP781	3.89	18.33	22.22
All	42.22	57.78	100.00

In [75]:

```
np.round((pd.crosstab([data.Product],data.Gender,margins=True,normalize="columns"))*100,
```

Out[75]:

Gender	**Female**	**Male**	**All**
Product			
KP281	52.63	38.46	44.44
KP481	38.16	29.81	33.33
KP781	9.21	31.73	22.22

Suggestions

- Since there aren't many women using the machine, we need to encourage them to work out more with a marketing campaign.
- The KP281 and KP481 treadmills are liked by people making between 39000 dollars and 53000 dollars a year. We should advertise these as affordable options.
- We should offer good customer support and suggest upgrading to better treadmills after using the basic ones for a while.
- Targeting people over 40, especially with the KP781 treadmill, would be smart.
- The KP781 treadmill is great for serious athletes and pros because it has more features. Let's promote it using influencers and athletes.