In [1]:
```
import pandas as pd
import numpy as np
import plotly.express as px
import plotly.graph_objects as go
```

In [6]:
```
data = pd.read_csv("apple_products.csv")
```

In [7]:
```
data.head()
```

Out[7]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202

In [8]:
```
data.isnull().sum()
```

Out[8]:
```
Product Name           0
Product URL            0
Brand                  0
Sale Price             0
Mrp                    0
Discount Percentage    0
Number Of Ratings      0
Number Of Reviews      0
Upc                    0
Star Rating            0
Ram                    0
dtype: int64
```

- The dataset does not have any missing value

In [9]:
```
data.describe()
```

Out[9]:

	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	Star Rating
count	62.000000	62.000000	62.000000	62.000000	62.000000	62.000000
mean	80073.887097	88058.064516	9.951613	22420.403226	1861.677419	4.575806
std	34310.446132	34728.825597	7.608079	33768.589550	2855.883830	0.059190
min	29999.000000	39900.000000	0.000000	542.000000	42.000000	4.500000
25%	49900.000000	54900.000000	6.000000	740.000000	64.000000	4.500000
50%	75900.000000	79900.000000	10.000000	2101.000000	180.000000	4.600000
75%	117100.000000	120950.000000	14.000000	43470.000000	3331.000000	4.600000
max	140900.000000	149900.000000	29.000000	95909.000000	8161.000000	4.700000

In [10]:
```
data.head()
```

Out[10]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202

In [11]:
```
highest_rated = data.sort_values(by = ['Star Rating'], ascending = False)
highest_rated = highest_rated.head(10)
```

In [12]:
```
print(highest_rated['Product Name'])
```

```
15                APPLE iPhone 11 Pro Max (Gold, 64 GB)
20      APPLE iPhone 11 Pro Max (Midnight Green, 64 GB)
17          APPLE iPhone 11 Pro Max (Space Grey, 64 GB)
16     APPLE iPhone 11 Pro Max (Midnight Green, 256 GB)
14               APPLE iPhone 11 Pro Max (Gold, 256 GB)
0                     APPLE iPhone 8 Plus (Gold, 64 GB)
12    Apple iPhone XR (Black, 128 GB) (Includes EarP...
11    Apple iPhone XR (Coral, 128 GB) (Includes EarP...
9     Apple iPhone XR ((PRODUCT)RED, 128 GB) (Includ...
1              APPLE iPhone 8 Plus (Space Grey, 256 GB)
Name: Product Name, dtype: object
```

In [13]:
```
print(highest_rated['Product Name'])
```

```
15                APPLE iPhone 11 Pro Max (Gold, 64 GB)
20      APPLE iPhone 11 Pro Max (Midnight Green, 64 GB)
17          APPLE iPhone 11 Pro Max (Space Grey, 64 GB)
16     APPLE iPhone 11 Pro Max (Midnight Green, 256 GB)
14               APPLE iPhone 11 Pro Max (Gold, 256 GB)
0                     APPLE iPhone 8 Plus (Gold, 64 GB)
12    Apple iPhone XR (Black, 128 GB) (Includes EarP...
11    Apple iPhone XR (Coral, 128 GB) (Includes EarP...
9     Apple iPhone XR ((PRODUCT)RED, 128 GB) (Includ...
1              APPLE iPhone 8 Plus (Space Grey, 256 GB)
Name: Product Name, dtype: object
```

How many ratings do the highest-rated iPhones on Flipkart have ?

In [14]:
```
data.head()
```

Out[14]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202

In [15]:
```
iphones = highest_rated['Product Name'].value_counts()
label = iphones.index
counts = highest_rated['Number Of Ratings']
figure = px.bar(highest_rated, x = label, y = counts)
figure.show()
```

Which iPhone has the highest number of ratings on Flipkart ?

In [16]:
```
data.head()
```

Out[16]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202

In [17]:
```
iphones = highest_rated['Product Name'].value_counts()
label = iphones.index
counts = highest_rated['Number Of Reviews']
figure = px.bar(highest_rated, x = label, y = counts, title = 'Number of Reviews
figure.show()
```

What is the Relationship between the sale price of iPhones and the number of ratings on Flipkart ?

In [18]:
```
data.head()
```

Out[18]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202

In [19]:
```
figure = px.scatter(data_frame = data, x = "Number Of Ratings", y = 'Sale Price'
                    size = 'Discount Percentage', trendline = 'ols',
                    title = 'Relationship between Sales Price and Number of Rati

figure.show()
```

- There is a negative linear relationship between the sale price of iPhones and the number of ratings. It means iPhones with lower sales prices are sole more in India.

In [20]:
```
figure = px.scatter(data_frame = data, x = "Number Of Ratings",
                y = "Discount Percentage", size = "Sale Price",
                trendline = "ols",
                title = "Relationship Between Discount and Number of Ratings of

figure.show()
```

Most Expensive and Least Expensive iPhones

In [21]:
```
data.head()
```

Out[21]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202

In [23]:

```
most_expensive = data.loc[data['Sale Price'].idxmax()]
least_expensive = data.loc[data['Sale Price'].idxmin()]

# Display the results
print(f"Most Expensive Product: {most_expensive}")
print("\n")
print(f"Least Expensive product: {least_expensive} ")
```

```
Most Expensive Product: Product Name                        APPLE iPhone 12 Pro
(Silver, 512 GB)
Product URL            https://www.flipkart.com/apple-iphone-12-pro-s...
Brand                                                              Apple
Sale Price                                                        140900
Mrp                                                               149900
Discount Percentage                                                   6
Number Of Ratings                                                   542
Number Of Reviews                                                    42
Upc                                                      MOBFWBYZ5UY6ZBVA
Star Rating                                                         4.5
Ram                                                               4 GB
Name: 24, dtype: object


Least Expensive product: Product Name                       APPLE iPhone S
E (White, 64 GB)
Product URL            https://www.flipkart.com/apple-iphone-se-white...
Brand                                                              Apple
Sale Price                                                        29999
Mrp                                                               39900
Discount Percentage                                                  24
Number Of Ratings                                                 95807
Number Of Reviews                                                  8154
Upc                                                      MOBFWQ6BGWDVGF3E
Star Rating                                                         4.5
Ram                                                               2 GB
Name: 52, dtype: object
```

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]: