

# iPhone Sales Analysis - PROJECT

## 1. Import required libraries and retrieve top 5 and bottom 5 records.

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go
```

```
data = pd.read_csv("apple_products.csv")
data.head()
```

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	Upc	Star Rating	Ram
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431	356	MOBEXRGV7EHHTGUH	4.6	2 GB
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431	356	MOBEXRGVAC6TJT4F	4.6	2 GB
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431	356	MOBEXRGVGTABXWZ	4.6	2 GB
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202	794	MOBEXRGVMZVUHCBA	4.5	2 GB
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202	794	MOBEXRGVPK7PFEJZ	4.5	2 GB

```
data.tail()
```

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	Upc	Star Rating	Ram
57	APPLE iPhone SE (Black, 64 GB)	https://www.flipkart.com/apple-iphone-se-black...	Apple	29999	39900	24	95909	8161	MOBFWQ6BR3MK7AUG	4.5	4 GB
58	APPLE iPhone 11 (Purple, 64 GB)	https://www.flipkart.com/apple-iphone-11-purpl...	Apple	46999	54900	14	43470	3331	MOBFWQ6BTFFJKGKE	4.6	4 GB
59	APPLE iPhone 11 (White, 64 GB)	https://www.flipkart.com/apple-iphone-11-white...	Apple	46999	54900	14	43470	3331	MOBFWQ6BWWVEH3XE	4.6	4 GB
60	APPLE iPhone 11 (Black, 64 GB)	https://www.flipkart.com/apple-iphone-11-black...	Apple	46999	54900	14	43470	3331	MOBFWQ6BXGJCCEYNY	4.6	4 GB
61	APPLE iPhone 11 (Red, 64 GB)	https://www.flipkart.com/apple-iphone-11-red-6...	Apple	46999	54900	14	43470	3331	MOBFWQ6BYVY3FCU7	4.6	4 GB

2. Check the info of the dataframe and write your inferences on data types and shape of the dataset

```
data.info() ## info () function Provides basic information about the data frame.
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 62 entries, 0 to 61
```

## 2. Check the info of the dataframe and write your inferences on data types and shape of the dataset

In [13]:	<pre>data.info() ## Info () function Provides basic information about the data frame. &lt;class 'pandas.core.frame.DataFrame'&gt; RangeIndex: 62 entries, 0 to 61 Data columns (total 11 columns): #   Column              Non-Null Count  Dtype ---  - 0   Product Name        62 non-null     object 1   Product URL         62 non-null     object 2   Brand               62 non-null     object 3   Sale Price          62 non-null     int64 4   Mrp                 62 non-null     int64 5   Discount Percentage 62 non-null     int64 6   Number Of Ratings   62 non-null     int64 7   Number Of Reviews   62 non-null     int64 8   Upc                 62 non-null     object 9   Star Rating         62 non-null     float64 10  Ram                 62 non-null     object dtypes: float64(1), int64(5), object(5) memory usage: 5.5+ KB</pre>
In [14]:	<pre>data.shape ## shows total number of rows and columns in the dataset.</pre>
Out[14]:	(62, 11)
In [15]:	<pre>data.dtypes ## shows the datatype of each column.</pre>
Out[15]:	<pre>Product Name        object Product URL         object Brand               object Sale Price          int64 Mrp                 int64 Discount Percentage  int64 Number Of Ratings   int64 Number Of Reviews   int64 Upc                 object Star Rating         float64 Ram                 object dtype: object</pre>

## 3. Check for the missing values and drop or impute them

In [16]:	<pre>print(data.isnull().sum())  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</pre>
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## 4. Statistical summary

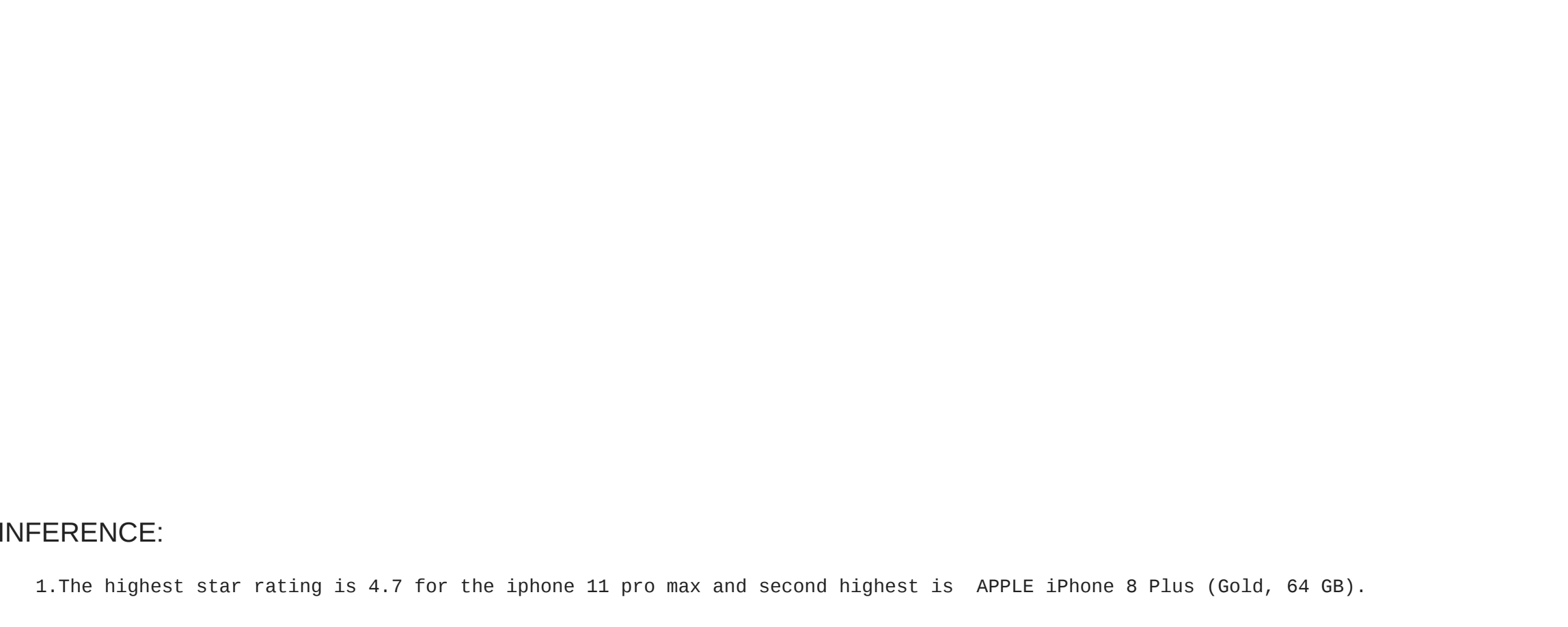
The statistical summary of the iphone sales data:						
	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	Star Rating
count	62.000000	62.000000	62.000000	62.000000	62.000000	62.000000
mean	80073.887097	88058.064516	9.951613	22420.403226	1861.677419	4.575806
std	34310.446132	34728.825597	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

Top 10 iPhones which has Highest Star rating in India on Flipkart.

```
Highrated_iphone = data.sort_values(by=["Star Rating"],
                                   ascending=False)
```

## Top 10 iPhones which has Highest Star rating in India on Flipkart.

In [27]:	<pre>Highrated_iphone = data.sort_values(by=["Star Rating"],                                      ascending=False) Highrated_iphone = Highrated_iphone.head(10) print('Top 10 iPhones which has Highest Star rating in India on Flipkart :') print(Highrated_iphone[["Product Name", 'Mrp', 'Star Rating']])  Top 10 iPhones which has highest rating in India on Flipkart :                                      Product Name      Mrp      Star Rating 17  APPLE iPhone 11 Pro Max (Space Grey, 64 GB)  117100           4.7 16  APPLE iPhone 11 Pro Max (Midnight Green, 256 GB)  131900           4.7 15  APPLE iPhone 11 Pro Max (Gold, 64 GB)  117100           4.7 14  APPLE iPhone 11 Pro Max (Gold, 256 GB)  131900           4.7 0   APPLE iPhone 8 Plus (Gold, 64 GB)  49900           4.6 29  APPLE iPhone 12 (White, 128 GB)  84900           4.6 32  APPLE iPhone 12 Pro Max (Graphite, 128 GB)  129900           4.6 35  APPLE iPhone 12 (Black, 128 GB)  84900           4.6 36  APPLE iPhone 12 (Blue, 128 GB)  84900           4.6</pre>
In [30]:	<pre>iphones = highest_rated["Product Name"].value_counts() label = iphones.index counts = highest_rated["Star Rating"] figure = px.scatter(highest_rated, x=label,                     y = counts,                     title="Number of Highest Star Rated iPhones") figure.show()</pre>



## INFERENCE:

- 1.The highest star rating is 4.7 for the iphone 11 pro max and second highest is APPLE iPhone 8 Plus (Gold, 64 GB).

## 6. Total Number of Reviews for Highest Star Rated iPhones in Flipkart

In [38]:	<pre>iphones = highest_rated["Product Name"].value_counts() label = iphones.index counts = highest_rated["Number Of Reviews"] figure = px.scatter(highest_rated, x=label,                     y = counts, size="Number Of Reviews",                     title="Number of Reviews of Highest Rated iPhones") figure.show()</pre>
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## INFERENCE:

- 1.The highest no of reviews is given to the APPLE iPhone 8 Plus (Gold, 64 GB) which is also has star rating of 4.5.

## Least 10 iPhones which has Lowest Star rating in India on Flipkart.

In [39]:	<pre>Leastrated_iphone = data.sort_values(by=["Star Rating"],                                      ascending=True) Leastrated_iphone = Leastrated_iphone.head(10) print('Least 10 iPhones which has Lowest Star rating in India on Flipkart :') print(Leastrated_iphone[["Product Name", 'Mrp', 'Star Rating']])  Least 10 iPhones which has Lowest Star rating in India on Flipkart :                                      Product Name      Mrp      Star Rating 38  APPLE iPhone 12 Pro (Graphite, 128 GB)  119900           4.5 37  APPLE iPhone 12 Mini (Red, 64 GB)  69900           4.5 28  APPLE iPhone 12 Mini (White, 64 GB)  69900           4.5 27  APPLE iPhone 12 Pro (Graphite, 256 GB)  129900           4.5 26  APPLE iPhone 12 Mini (White, 128 GB)  74900           4.5 24  APPLE iPhone 12 Pro (Silver, 512 GB)  149900           4.5 41  Apple iPhone SE (White, 256 GB) [Includes EarP...  54900           4.5 45  APPLE iPhone 12 Pro (Pacific Blue, 512 GB)  149900           4.5 45  APPLE iPhone 12 Mini (Black, 64 GB)  69900           4.5 33  APPLE iPhone 12 Mini (Black, 128 GB)  74900           4.5</pre>
In [42]:	<pre>iphones1 = Leastrated_iphone["Product Name"].value_counts() label1 = iphones1.index counts1 = Leastrated_iphone["Star Rating"] figure = px.line(Leastrated_iphone, x=label1,                  y = counts1,                  title="Number of Lowest Star Rated iPhones") figure.show()</pre>

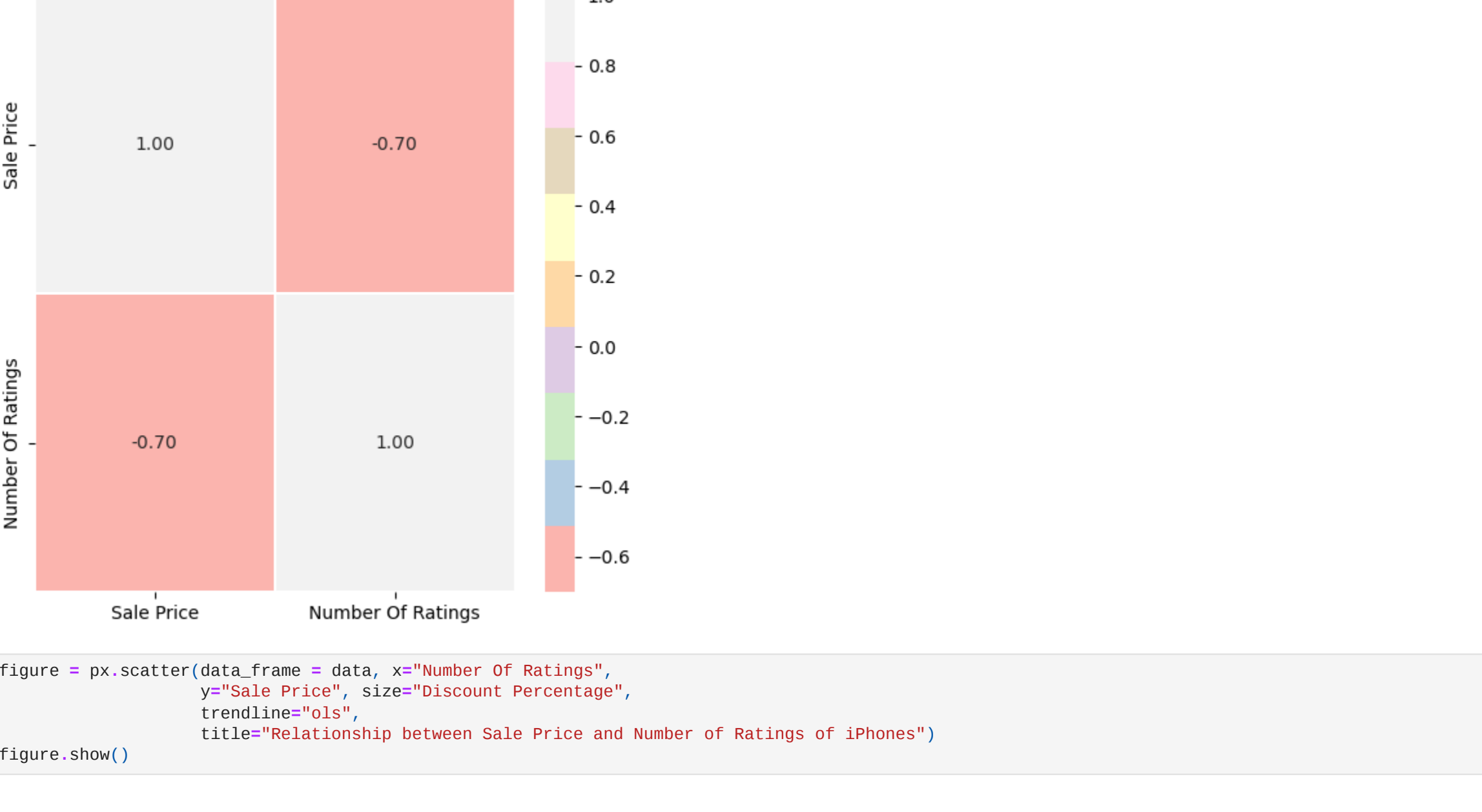


## INFERENCE:

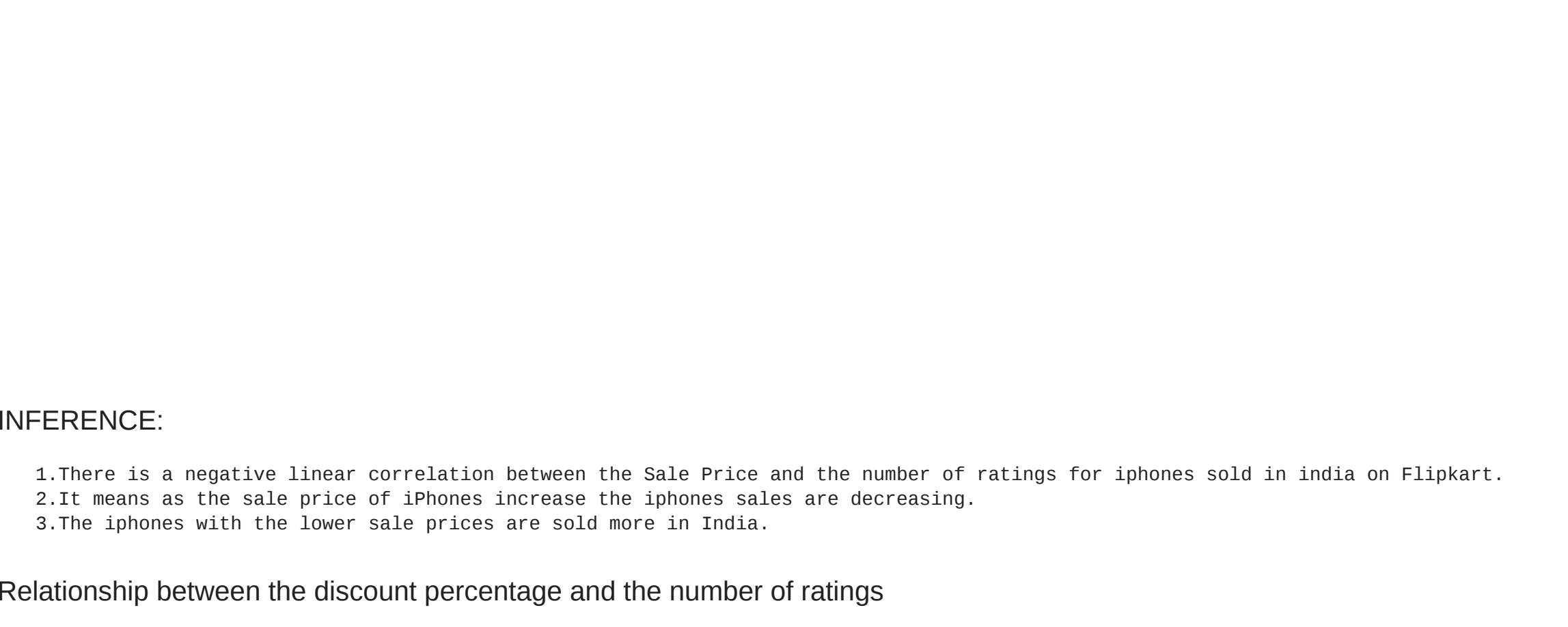
- 1.The lowest Star rating for the iphones is 4.5 stars.
- 2.The iphone 12 mini has least star rating of 4.5

## Relationship between the sale price of iPhones and their ratings on Flipkart

In [43]:	<pre>df_data=data[["Sale Price","Number Of Ratings",]] correlation = data["Sale Price"].corr(data["Number Of Ratings"]) print("The Correlation Matrix for Sale Price and Number Of Ratings:") print(df_data.corr()) print("The Correlation Value for Sale Price and Number Of Ratings:") print(correlation)  The Correlation Matrix for Sale Price and Number Of Ratings: Sale Price      Number Of Ratings Sale Price      1.000000      -0.701526 Number Of Ratings  -0.701526      1.000000 The Correlation Value for Sale Price and Number Of Ratings: -0.7015259181182826</pre>
In [50]:	<pre>figure1 = plt.subplots(figsize=(6, 6)) sns.heatmap(df_data.corr(), annot=True, linewidths=0.05, fmt= '.2f', cmap="Pastel1") # the color intensity is based on plt.show()</pre>



In [7]:	<pre>figure = px.scatter(data_frame = data, x="Number Of Ratings",                     y="Sale Price", size="Discount Percentage",                     trendline="ols",                     title="Relationship between Sale Price and Number of Ratings of iPhones") figure.show()</pre>
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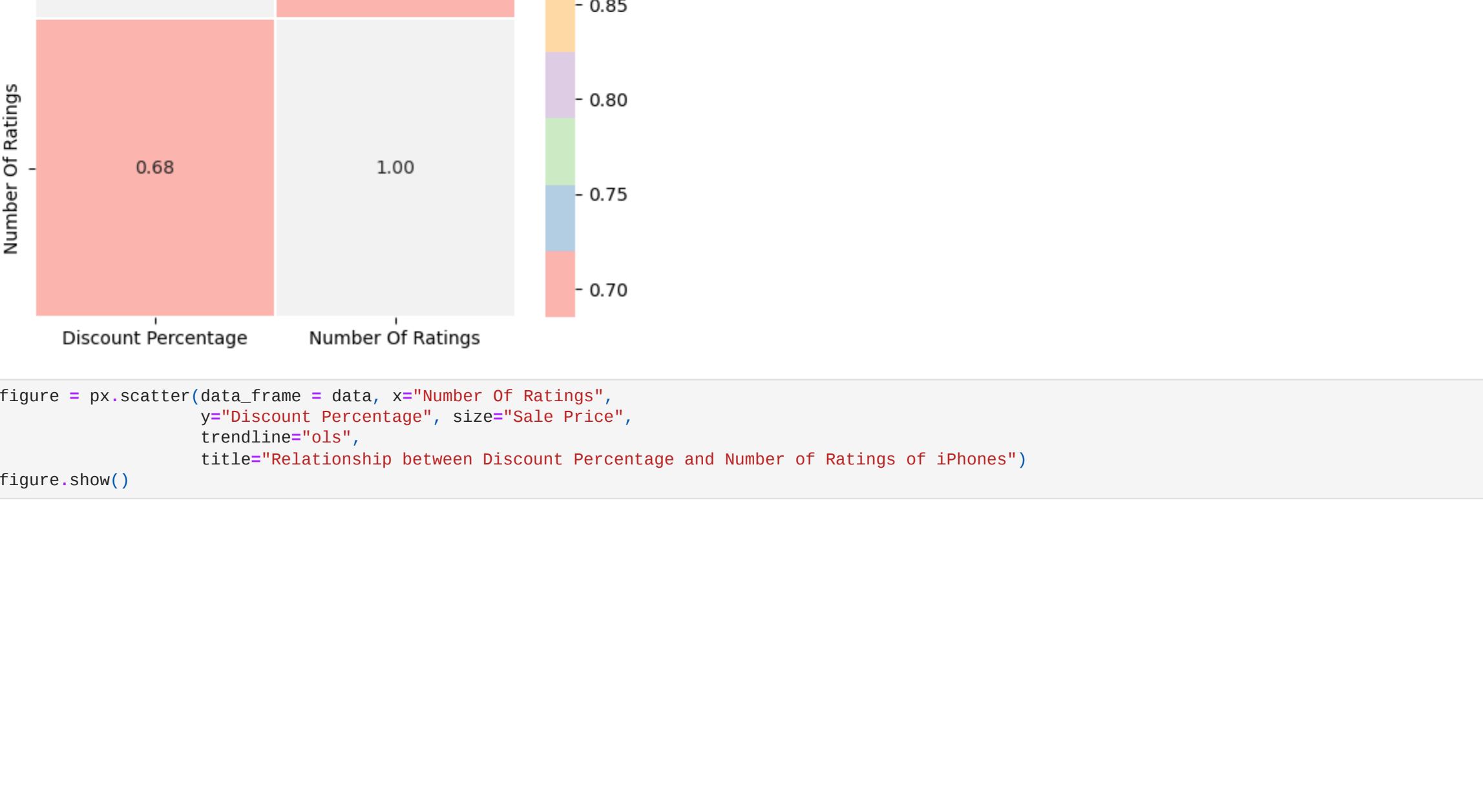


## INFERENCE:

- 1.There is a negative linear correlation between the Sale Price and the number of ratings for iphones sold in india on Flipkart.
- 2.It means as the sale price of iPhones increase the iphones sales are decreasing.
- 3.The iphones with the lower sale prices are sold more in India.

## Relationship between the discount percentage and the number of ratings

In [51]:	<pre>df_data1=data[["Discount Percentage","Number Of Ratings",]] correlation1 = data["Discount Percentage"].corr(data["Number Of Ratings"]) print("The Correlation Matrix for Discount Percentage and Number Of Ratings:") print(df_data1.corr()) print("The Correlation Value for Discount Percentage and Number Of Ratings:") print(correlation1)  The Correlation Matrix for Discount Percentage and Number Of Ratings: Discount Percentage      Number Of Ratings Discount Percentage      1.000000      0.684827 Number Of Ratings        0.684827      1.000000 The Correlation Value for Discount Percentage and Number Of Ratings: 0.6848279553548624</pre>
In [54]:	<pre>figure2 = plt.subplots(figsize=(6, 6)) sns.heatmap(df_data1.corr(), annot=True, linewidths=0.05, fmt= '.2f', cmap="Pastel1") # the color intensity is based on plt.show()</pre>



In [8]:	<pre>figure = px.scatter(data_frame = data, x="Number Of Ratings",                     y="Discount Percentage", size="Sale Price",                     trendline="ols",                     title="Relationship between Discount Percentage and Number of Ratings of iPhones") figure.show()</pre>
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## INFERENCE:

- 1.There is a positive linear correlation between the discount percentage and the number of ratings for iphones sold in india on Flipkart.
- 2.The iPhones with more discount price are sold more in Flipkart India

## Insights about iphones sales in india:

1. APPLE iPhone 8 Plus (Gold, 64 GB) has the high rating and reviews which is most appreciated iPhone in India
2. iPhones with lower sale prices are sold more in India.
3. iPhones with High discount Price are sold more in India.

This summary highlights three key insights regarding the preferences of Indian consumers on Flipkart when it comes to Apple iPhones.

- 1.Firstly, the Apple iPhone 8 Plus (Gold, 64 GB) has garnered high ratings and reviews, making it the most appreciated iPhone in the Indian market.

- 2.Secondly, there is a clear trend in India where iPhones with lower sale prices are more likely to attract higher sales volumes. The affordability factor plays a significant role in driving the demand for these models, making them accessible to a wider segment of the Indian population.

- 3.The analysis indicates that iPhones with high discount prices also experience a surge in sales in India. Consumers in the country are evidently keen on securing a good deal and are motivated by discounts when making their purchasing decisions.

- 4.The Indian market's affinity for Apple iPhones is influenced by factors such as high ratings and reviews, lower sale prices, and attractive discounts. By understanding these insights, manufacturers and retailers can better cater to the preferences of Indian consumers and adapt their marketing strategies accordingly to capitalize on the country's booming smartphone market.