IPHONE SALES DATA ANALYSIS PROJECT

In [1]: ⏭
```python
# IMPORTING LIB
# NUMPY FOR MATHEMATICAL OPERATIONS
# PANDAS FOR CLEAN DATA
# PLOTLY FOR GRAGH
```

In [2]: ⏭
```python
import pandas as pd
import numpy as np
import plotly.express as px
import plotly.graph_objects as go
```

In [4]: ⏭
```python
data=pd.read_csv("apple_products.csv")
data
```

Out[4]:

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	Upc	Star Rating	Ran
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	GE
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	GE
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431	356	MOBEXRGVGETABXWZ	4.6	GE
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202	794	MOBEXRGVMZWUHCBA	4.5	GE
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	GE
...	...	...	...	...	...	...	...	...	...	...	.
57	APPLE iPhone SE (Black, 64 GB)	https://www.flipkart.com/apple-iphone-se-black...	Apple	29999	39900	24	95909	8161	MOBFWQ6BR3MK7AUG	4.5	GE
58	APPLE iPhone 11 (Purple, 64 GB)	https://www.flipkart.com/apple-iphone-11-purpl...	Apple	46999	54900	14	43470	3331	MOBFWQ6BTFFJKGKE	4.6	GE
59	APPLE iPhone 11 (White, 64 GB)	https://www.flipkart.com/apple-iphone-11-white...	Apple	46999	54900	14	43470	3331	MOBFWQ6BVWVEH3XE	4.6	GE
60	APPLE iPhone 11 (Black, 64 GB)	https://www.flipkart.com/apple-iphone-11-black...	Apple	46999	54900	14	43470	3331	MOBFWQ6BXGJCEYNY	4.6	GE
61	APPLE iPhone 11 (Red, 64 GB)	https://www.flipkart.com/apple-iphone-11-red-6...	Apple	46999	54900	14	43470	3331	MOBFWQ6BYYV3FCU7	4.6	GE

62 rows × 11 columns

In [5]: ▶| `print(data.head())`

```
                                     Product Name  \
0               APPLE iPhone 8 Plus (Gold, 64 GB)
1        APPLE iPhone 8 Plus (Space Grey, 256 GB)
2          APPLE iPhone 8 Plus (Silver, 256 GB)
3               APPLE iPhone 8 (Silver, 256 GB)
4                 APPLE iPhone 8 (Gold, 256 GB)

                                     Product URL  Brand  Sale Price  \
0  https://www.flipkart.com/apple-iphone-8-plus-g... (https://www.flipkart.com/apple-iphone-8-plus-g...)
Apple        49900
1  https://www.flipkart.com/apple-iphone-8-plus-s... (https://www.flipkart.com/apple-iphone-8-plus-s...)
Apple        84900
2  https://www.flipkart.com/apple-iphone-8-plus-s... (https://www.flipkart.com/apple-iphone-8-plus-s...)
Apple        84900
3  https://www.flipkart.com/apple-iphone-8-silver... (https://www.flipkart.com/apple-iphone-8-silver...)
Apple        77000
4  https://www.flipkart.com/apple-iphone-8-gold-2... (https://www.flipkart.com/apple-iphone-8-gold-2...)
Apple        77000

     Mrp  Discount Percentage  Number Of Ratings  Number Of Reviews  \
0  49900                    0               3431                356
1  84900                    0               3431                356
2  84900                    0               3431                356
3  77000                    0              11202                794
4  77000                    0              11202                794

               Upc  Star Rating   Ram
0  MOBEXRGV7EHHTGUH          4.6  2 GB
1  MOBEXRGVAC6TJT4F          4.6  2 GB
2  MOBEXRGVGETABXWZ          4.6  2 GB
3  MOBEXRGVMZWUHCBA          4.5  2 GB
4  MOBEXRGVPK7PFEJZ          4.5  2 GB
```

In [6]: ▶| `data.head()`

Out[6]:

	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	MOBEXRGVGETABXWZ	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	MOBEXRGVMZWUHCBA	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

In [7]: ▶| `data.isnull().sum() # CHECKING MISSING VALUES`

Out[7]:
```
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 [8]:    ▶| data.describe() # small small analysis
```

Out[8]:

	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 [9]:    ▶| # 1) WHAT ARE THE TOP 10 HIGHEST-RATED IPHONES ON FLIPKART IN INDIA?
```

```
In [10]:   ▶| highest_rated=data.sort_values(by =["Star Rating"], ascending= False)  # order-- descending
              highest_rated=highest_rated.head(10)
              print(highest_rated['Product Name'])
```

```
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)
15             APPLE iPhone 11 Pro Max (Gold, 64 GB)
14            APPLE iPhone 11 Pro Max (Gold, 256 GB)
0                 APPLE iPhone 8 Plus (Gold, 64 GB)
29                APPLE iPhone 12 (White, 128 GB)
32       APPLE iPhone 12 Pro Max (Graphite, 128 GB)
35                APPLE iPhone 12 (Black, 128 GB)
36                 APPLE iPhone 12 (Blue, 128 GB)
Name: Product Name, dtype: object
```

In [11]: ▶ | `print(highest_rated)`

```
                              Product Name  \
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)
15              APPLE iPhone 11 Pro Max (Gold, 64 GB)
14             APPLE iPhone 11 Pro Max (Gold, 256 GB)
0                   APPLE iPhone 8 Plus (Gold, 64 GB)
29                   APPLE iPhone 12 (White, 128 GB)
32          APPLE iPhone 12 Pro Max (Graphite, 128 GB)
35                   APPLE iPhone 12 (Black, 128 GB)
36                    APPLE iPhone 12 (Blue, 128 GB)

                              Product URL  Brand  Sale Price  \
20  https://www.flipkart.com/apple-iphone-11-pro-m... (https://www.flipkart.com/apple-iphone-11-pro-m...)
Apple      117100
17  https://www.flipkart.com/apple-iphone-11-pro-m... (https://www.flipkart.com/apple-iphone-11-pro-m...)
Apple      117100
16  https://www.flipkart.com/apple-iphone-11-pro-m... (https://www.flipkart.com/apple-iphone-11-pro-m...)
Apple      131900
15  https://www.flipkart.com/apple-iphone-11-pro-m... (https://www.flipkart.com/apple-iphone-11-pro-m...)
Apple      117100
14  https://www.flipkart.com/apple-iphone-11-pro-m... (https://www.flipkart.com/apple-iphone-11-pro-m...)
Apple      131900
0   https://www.flipkart.com/apple-iphone-8-plus-g... (https://www.flipkart.com/apple-iphone-8-plus-g...)
Apple       49900
29  https://www.flipkart.com/apple-iphone-12-white... (https://www.flipkart.com/apple-iphone-12-white...)
Apple       75900
32  https://www.flipkart.com/apple-iphone-12-pro-m... (https://www.flipkart.com/apple-iphone-12-pro-m...)
Apple      120900
35  https://www.flipkart.com/apple-iphone-12-black... (https://www.flipkart.com/apple-iphone-12-black...)
Apple       75900
36  https://www.flipkart.com/apple-iphone-12-blue-... (https://www.flipkart.com/apple-iphone-12-blue-...)
Apple       75900

       Mrp  Discount Percentage  Number Of Ratings  Number Of Reviews  \
20  117100                    0               1078                101
17  117100                    0               1078                101
16  131900                    0               1078                101
15  117100                    0               1078                101
14  131900                    0               1078                101
0    49900                    0               3431                356
29   84900                   10               2101                180
32  129900                    6                580                 45
35   84900                   10               2101                180
36   84900                   10               2101                180

              Upc  Star Rating   Ram
20  MOBFKCTSRYPAQNYT          4.7  4 GB
17  MOBFKCTSKDMKCGQS          4.7  4 GB
16  MOBFKCTSCAAKGQV7          4.7  4 GB
15  MOBFKCTSAPAYNSGG          4.7  4 GB
14  MOBFKCTS7HCHSPFH          4.7  4 GB
0    MOBEXRGV7EHHTGUH          4.6  2 GB
29  MOBFWBYZBTZFGJF9          4.6  6 GB
32  MOBFWBYZFDGQSDWS          4.6  6 GB
35  MOBFWBYZK3HACR72          4.6  6 GB
36  MOBFWBYZKPTZF9VG          4.6  6 GB
```
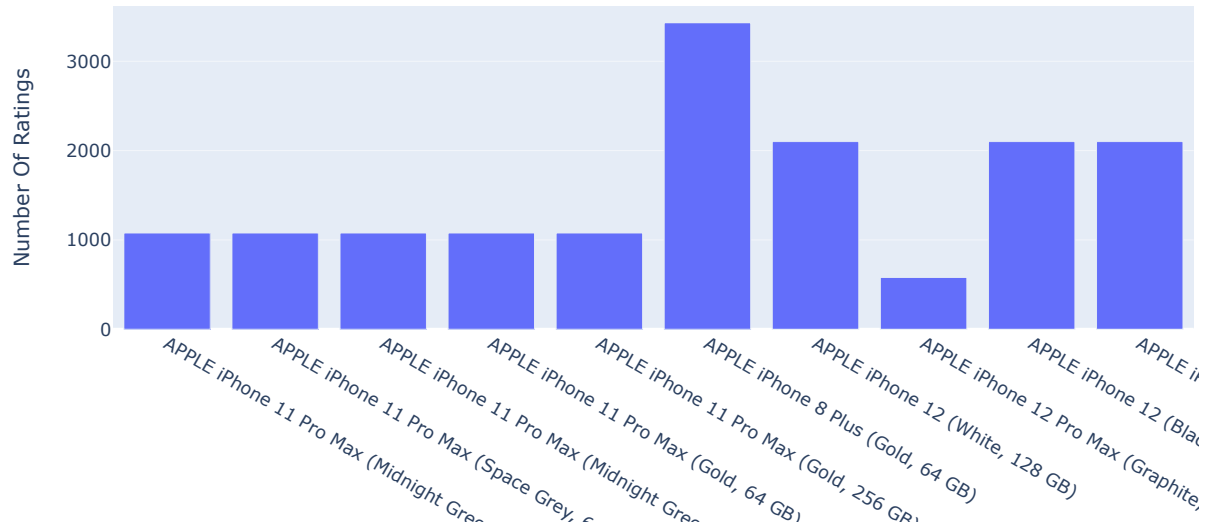
In [12]: ▶ | `# 2) HOW MANY RATINGS DO THE HIGHST-RATED IPHONES ON FLIPKART HAVE?`

In [13]: ▶|
```python
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,title="number of Ratings of highest Rated iphones")
figure.show()
```

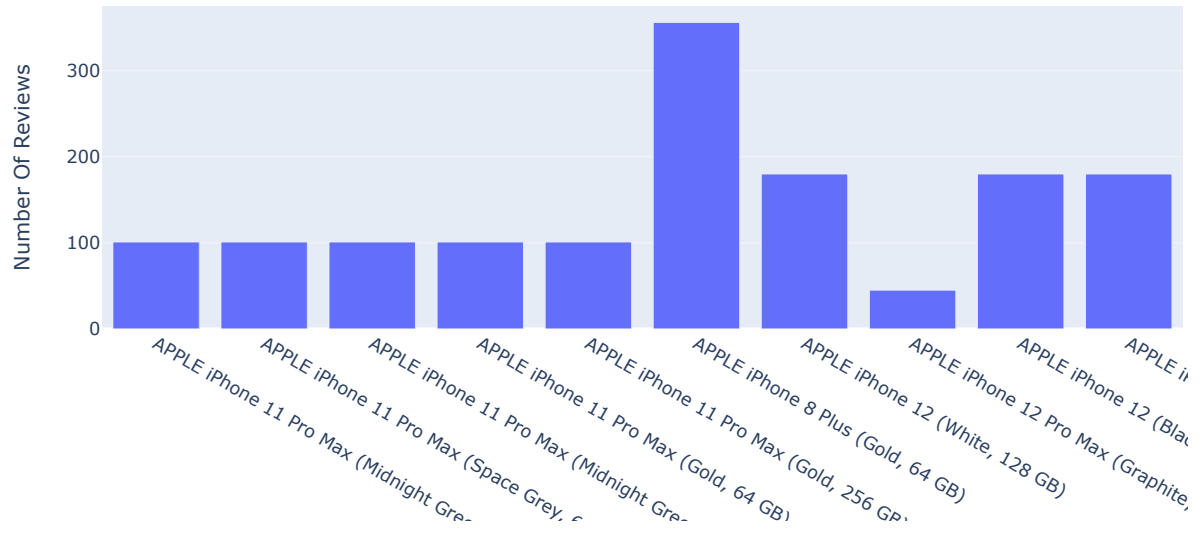number of Ratings of highest Rated iphones

CONCLUSION - apple iphone 8 plus(gold, 64 gb) have highest number of reviews=356

In [14]: ▶|
```python
# 3)WHICH IPHONE HAS THE HIGHEST NUMBER OF REVIEWS ON FLIPKART ?
```

In [15]: ▶|
```python
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 of highest Rated iphones")
figure.show()
```

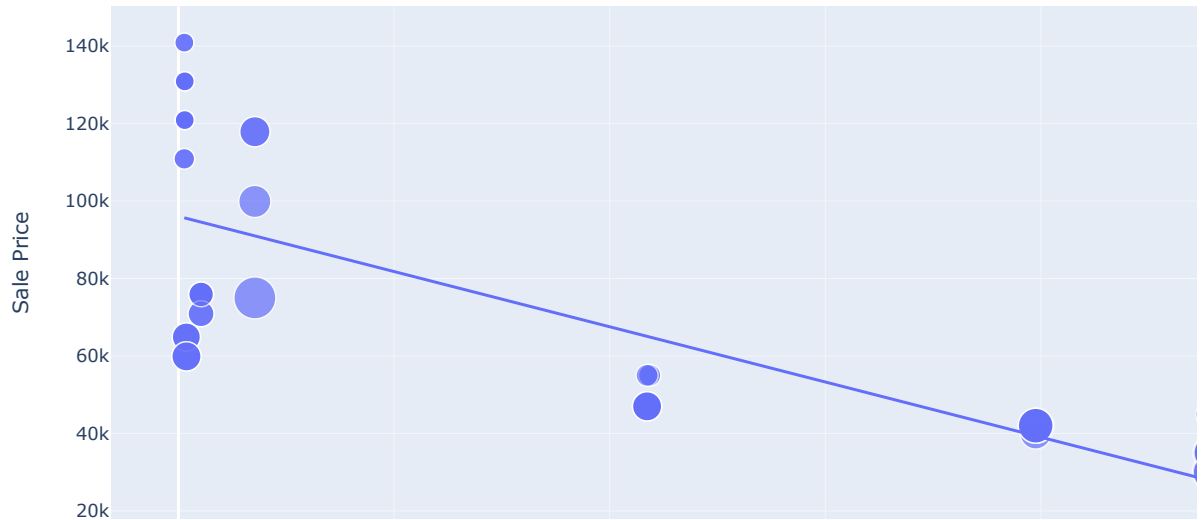number of Reviews of highest Rated iphones

CONCLUSION - apple iphone 8 plus(gold, 64 gb) have highest number of reviews=356

In [16]: ▶|
```python
# 4)WHAT IS THE RELATIONSHIP BETWEEN TH SALE PRICE OF IPHONES AND THE NUMBER OF RATINGS ON FLIPKART ?
```

In [17]:
```python
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()
```

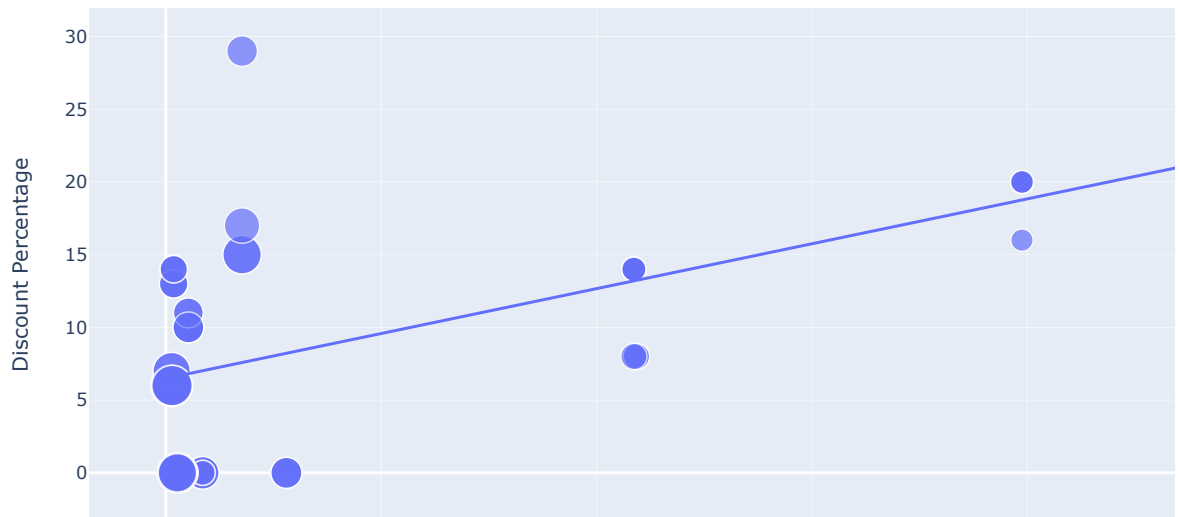Relationship between Sale Price and Number of Ratings of iPhones

There is a negative linear relationship between the sales price of iphones and the number of ratings.it means iphones with lower sales price are sold more in india

In [18]:
```python
# 5) WHAT IS THE RELATIONSHIP BETWEEN THE DISCOUNT PERCENTAGE AND THE NUMBER RATINGS OF IPHONE ON FLIPKART
```

In [19]:
```python
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")
figure.show()
```

Relationship between Discount Percentage and Number of Ratings

CONCLUSION - apple iphone 8 plus(gold,64 gb) is most apprrciated iphone in india discounts in cheap rated iphone to affordable for customers

In [20]:
```python
#6) CAN YOU FIGURE OUT THE LEAST EXPENSIVE AND MOST EXPENSIVE IPHONE IN THE INDIAN MARKET,
# ALONG WITH ALL THEIR SPECIFICATIONS?
```

In [21]: ▶
```python
most_expensive=data.loc[data['Sale Price'].idxmax()]
least_expensive=data.loc[data['Sale Price'].idxmin()]

# display the results
print("MOST EXPENSIVE PRODUCT...")
print(most_expensive)
print("\n LEAST EXPENSIVE PRODUCT...")
print(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... (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 SE (White, 64 GB)
Product URL          https://www.flipkart.com/apple-iphone-se-white... (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 [ ]: ▶