In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:
```
df = pd.read_csv("C:\\Users\\vaishnavi\\\\OneDrive\\Desktop\\sales_data_sample.csv"
df.head()
```

Out[3]:

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	ORDERDATE
0	10107	30	95.70	2	2871.00	2/24/2003 0:00
1	10121	34	81.35	5	2765.90	05-07-2003 00:00
2	10134	41	94.74	2	3884.34	07-01-2003 00:00
3	10145	45	83.26	6	3746.70	8/25/2003 0:00
4	10159	49	100.00	14	5205.27	10-10-2003 00:00

5 rows × 25 columns

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2823 entries, 0 to 2822
Data columns (total 25 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   ORDERNUMBER       2823 non-null   int64  
 1   QUANTITYORDERED   2823 non-null   int64  
 2   PRICEEACH         2823 non-null   float64
 3   ORDERLINENUMBER   2823 non-null   int64  
 4   SALES             2823 non-null   float64
 5   ORDERDATE         2823 non-null   object 
 6   STATUS            2823 non-null   object 
 7   QTR_ID            2823 non-null   int64  
 8   MONTH_ID          2823 non-null   int64  
 9   YEAR_ID           2823 non-null   int64  
 10  PRODUCTLINE       2823 non-null   object 
 11  MSRP              2823 non-null   int64  
 12  PRODUCTCODE       2823 non-null   object 
 13  CUSTOMERNAME      2823 non-null   object 
 14  PHONE             2823 non-null   object 
 15  ADDRESSLINE1      2823 non-null   object 
 16  ADDRESSLINE2      302 non-null    object 
 17  CITY              2823 non-null   object 
 18  STATE             1337 non-null   object 
 19  POSTALCODE        2747 non-null   object 
 20  COUNTRY           2823 non-null   object 
 21  TERRITORY         1749 non-null   object 
 22  CONTACTLASTNAME   2823 non-null   object 
 23  CONTACTFIRSTNAME  2823 non-null   object 
 24  DEALSIZE          2823 non-null   object 
dtypes: float64(2), int64(7), object(16)
memory usage: 551.5+ KB
```

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

Out[5]:

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	
count	2823.000000	2823.000000	2823.000000	2823.000000	2823.000000	282
mean	10258.725115	35.092809	83.658544	6.466171	3553.889072	
std	92.085478	9.741443	20.174277	4.225841	1841.865106	
min	10100.000000	6.000000	26.880000	1.000000	482.130000	
25%	10180.000000	27.000000	68.860000	3.000000	2203.430000	
50%	10262.000000	35.000000	95.700000	6.000000	3184.800000	
75%	10333.500000	43.000000	100.000000	9.000000	4508.000000	
max	10425.000000	97.000000	100.000000	18.000000	14082.800000	

In [6]:
```
fig = plt.figure(figsize=(12,10))
sns.heatmap(df.corr(), annot=True, fmt='.2f')
plt.show()
```

```
C:\Users\vaishnavi\AppData\Local\Temp\ipykernel_20220\1537228670.py:2: FutureWarning: The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_only to silence this warning.
  sns.heatmap(df.corr(), annot=True, fmt='.2f')
```

In [7]:
```
df= df[['PRICEEACH', 'MSRP']]
df.head()
```

Out[7]:

	PRICEEACH	MSRP
0	95.70	95
1	81.35	95
2	94.74	95
3	83.26	95
4	100.00	95

In [8]:
```
df.isna().any()
```

Out[8]:
```
PRICEEACH    False
MSRP         False
dtype: bool
```

In [9]:
```
df.describe().T
```

Out[9]:

	count	mean	std	min	25%	50%	75%	max
PRICEEACH	2823.0	83.658544	20.174277	26.88	68.86	95.7	100.0	100.0
MSRP	2823.0	100.715551	40.187912	33.00	68.00	99.0	124.0	214.0

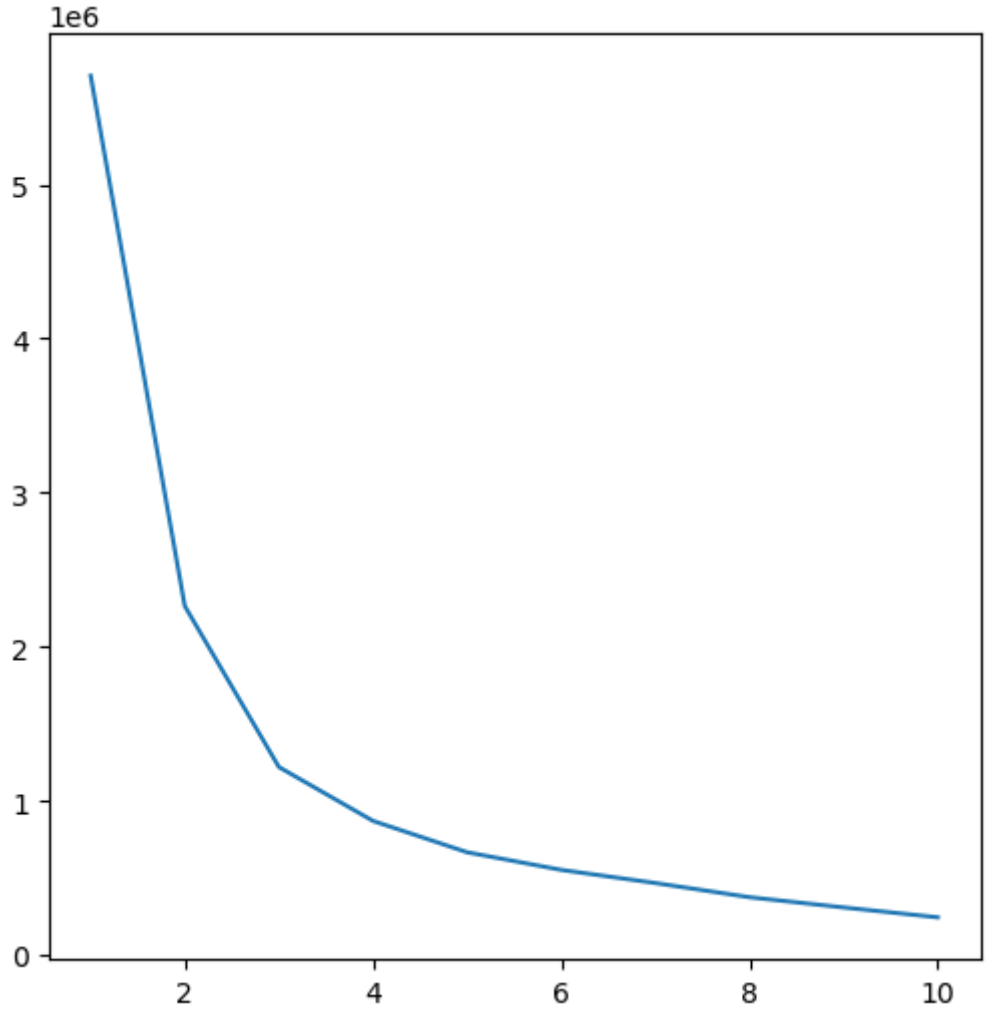
In [10]:
```
df.shape
```

Out[10]:
```
(2823, 2)
```

In [12]:
```
from sklearn.cluster import KMeans

inertia = []

for i in range(1, 11):
    clusters = KMeans(n_clusters=i, init='k-means++', random_state=42)
    clusters.fit(df)
    inertia.append(clusters.inertia_)

plt.figure(figsize=(6, 6))
sns.lineplot(x = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10], y = inertia)
```

```
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
```

Out[12]:
```
<Axes: >
```



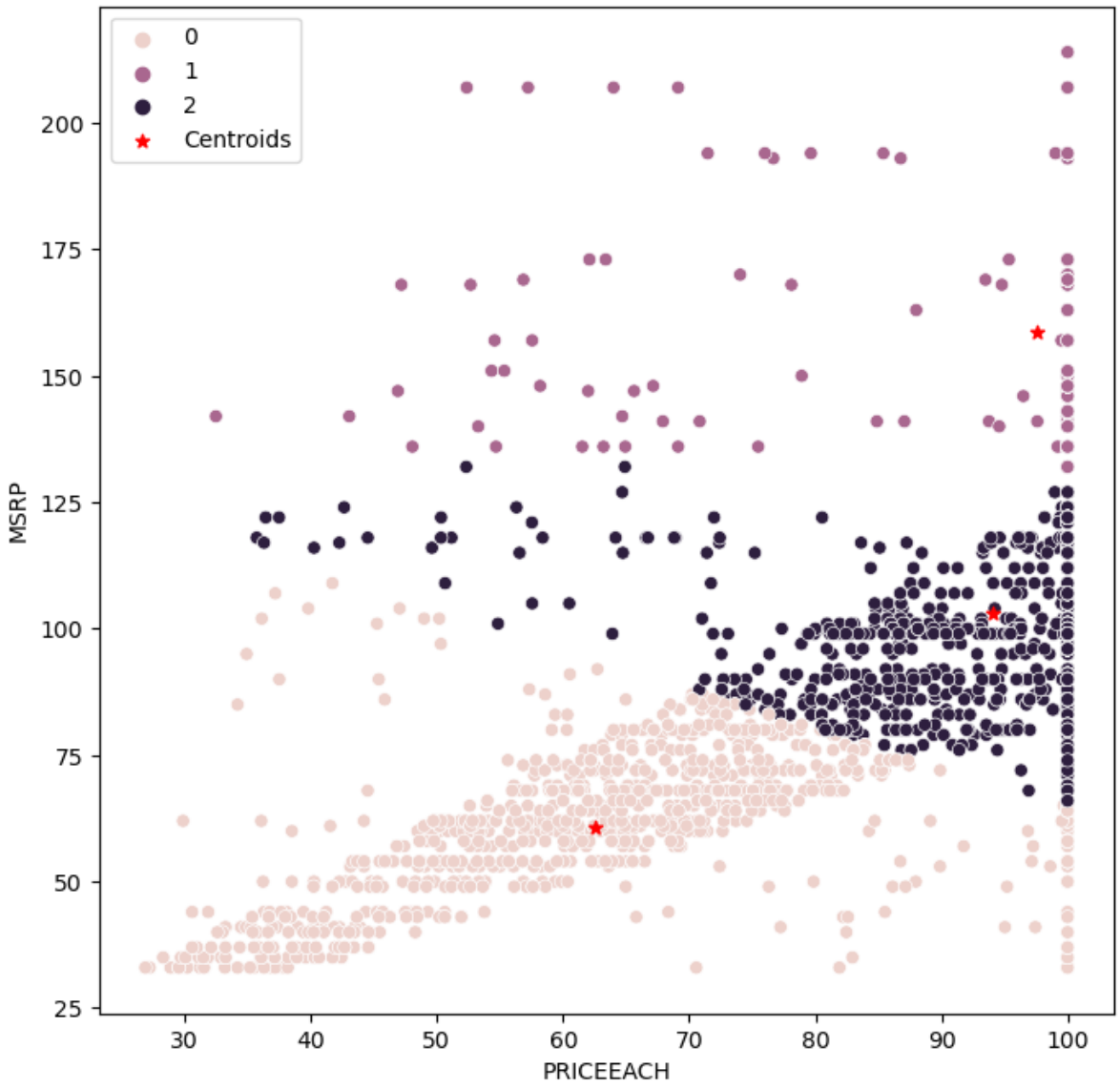
In [13]:
```
kmeans = KMeans(n_clusters = 3, random_state = 42)
y_kmeans = kmeans.fit_predict(df)
y_kmeans
```

```
C:\Users\vaishnavi\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:870: Fut
ureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Se
t the value of `n_init` explicitly to suppress the warning
  warnings.warn(
```

Out[13]:
```
array([2, 2, 2, ..., 0, 0, 0])
```

In [14]:
```
plt.figure(figsize=(8,8))
sns.scatterplot(x=df['PRICEEACH'], y=df['MSRP'], hue=y_kmeans)
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], c = 'red
plt.legend()
```

Out[14]:
```
<matplotlib.legend.Legend at 0x16cebb36f80>
```



In [15]:
```
kmeans.cluster_centers_
```

Out[15]:
```
array([[ 62.49548902,  60.71556886],
       [ 97.59890263, 158.7202473 ],
       [ 94.03841567, 102.88841567]])
```

In [ ]:
```

```