In [26]:
```
import pandas as pd
import numpy as np
import seaborn as sb
import matplotlib.pyplot as plt
```

In [3]:
```
df = pd.read_csv('house_price.csv')
```

In [5]:
```
df.head(10)
```

Out[5]:

	location	size	total_sqft	bath	price	bhk	price_per_sqft
0	Electronic City Phase II	2 BHK	1056.0	2	39.07	2	3699
1	Chikka Tirupathi	4 Bedroom	2600.0	5	120.00	4	4615
2	Uttarahalli	3 BHK	1440.0	2	62.00	3	4305
3	Lingadheeranahalli	3 BHK	1521.0	3	95.00	3	6245
4	Kothanur	2 BHK	1200.0	2	51.00	2	4250
5	Whitefield	2 BHK	1170.0	2	38.00	2	3247
6	Old Airport Road	4 BHK	2732.0	4	204.00	4	7467
7	Rajaji Nagar	4 BHK	3300.0	4	600.00	4	18181
8	Marathahalli	3 BHK	1310.0	3	63.25	3	4828
9	other	6 Bedroom	1020.0	6	370.00	6	36274

Q1

In [10]:
```
print("Shape of the dataset:", df.shape)
```

```
Shape of the dataset: (13200, 7)
```

In [14]:
```
df.describe()
```

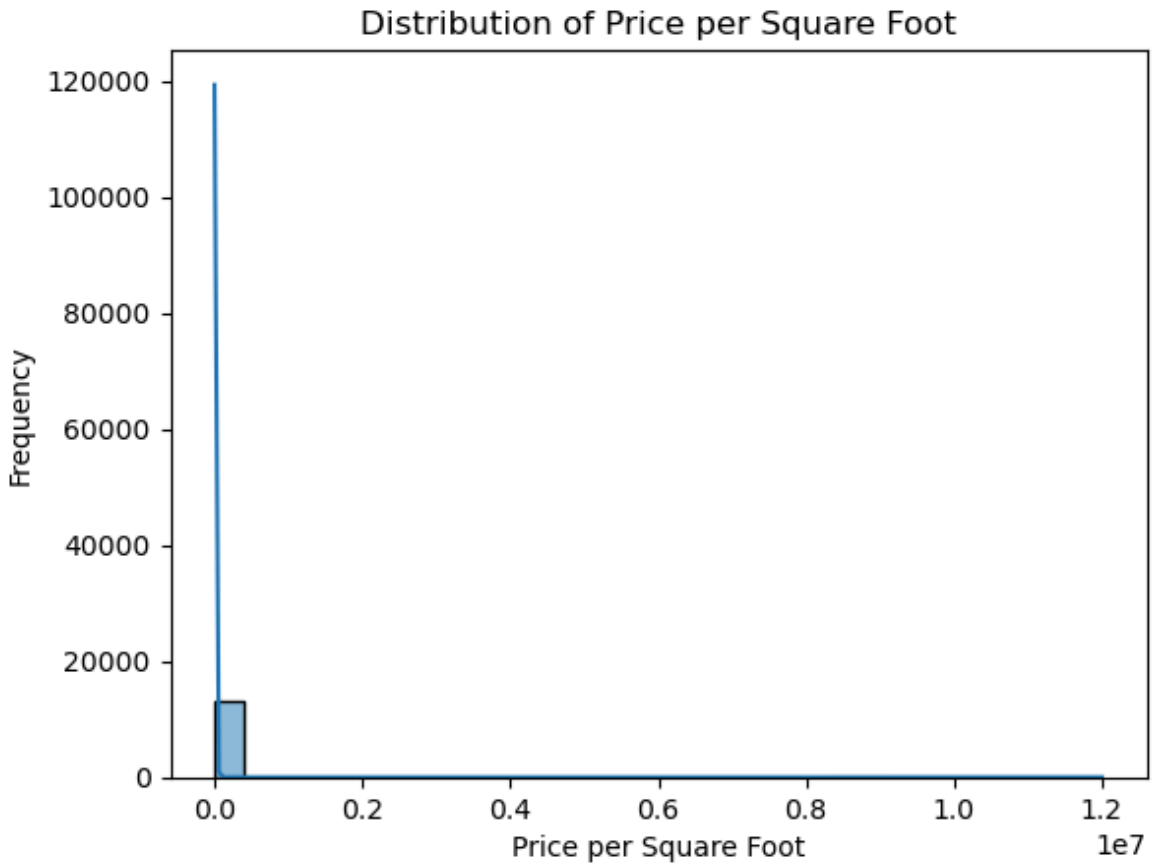
Out[14]:

	total_sqft	bath	price	bhk	price_per_sqft
count	13200.000000	13200.000000	13200.000000	13200.000000	1.320000e+04
mean	1555.302783	2.691136	112.276178	2.800833	7.920337e+03
std	1237.323445	1.338915	149.175995	1.292843	1.067272e+05
min	1.000000	1.000000	8.000000	1.000000	2.670000e+02
25%	1100.000000	2.000000	50.000000	2.000000	4.267000e+03
50%	1275.000000	2.000000	71.850000	3.000000	5.438000e+03
75%	1672.000000	3.000000	120.000000	3.000000	7.317000e+03
max	52272.000000	40.000000	3600.000000	43.000000	1.200000e+07

In [24]:
```
df.isnull().sum()
```

Out[24]:
```
location          0
size              0
total_sqft        0
bath              0
price             0
bhk               0
price_per_sqft    0
dtype: int64
```

In [28]:
```
sb.histplot(df['price_per_sqft'], bins=30, kde=True)
plt.title('Distribution of Price per Square Foot')
plt.xlabel('Price per Square Foot')
plt.ylabel('Frequency')
plt.show()
```



Q2

In [31]:
```
# Mean and Standard Deviation
```

In [33]:
```
mean = df['price_per_sqft'].mean()
std_dev = df['price_per_sqft'].std()
cut_off = std_dev * 3
lower_limit = mean - cut_off
upper_limit = mean + cut_off
```

In [35]:
```
print('Mean: ', mean, 'Standard Deviation: ', std_dev, 'Cut off: ', cut_off)
print('Lower limit:', lower_limit, 'Upper limit: ', upper_limit)
```

```
Mean:  7920.336742424242 Standard Deviation:  106727.16032810845 Cut off:  32018
1.48098432535
Lower limit: -312261.1442419011 Upper limit:  328101.8177267496
```

In [37]:
```
df_mean_std = df[(df['price_per_sqft'] >= lower_limit) & (df['price_per_sqft'] <
```

In [43]:
```
df_mean_std.describe()
```

Out[43]:

	total_sqft	bath	price	bhk	price_per_sqft
count	13195.000000	13195.00000	13195.000000	13195.000000	13195.000000
mean	1555.884482	2.69064	112.267415	2.800152	6713.708602
std	1237.196807	1.33853	149.200669	1.292344	4876.727718
min	15.000000	1.00000	8.000000	1.000000	267.000000
25%	1100.000000	2.00000	50.000000	2.000000	4266.500000
50%	1275.000000	2.00000	71.740000	3.000000	5434.000000
75%	1672.500000	3.00000	120.000000	3.000000	7313.000000
max	52272.000000	40.00000	3600.000000	43.000000	200000.000000

In [45]:
```
# Percentile Method
```

In [47]:
```
lower_percentile = df['price_per_sqft'].quantile(0.05)
upper_percentile = df['price_per_sqft'].quantile(0.95)
```

In [49]:
```
print('Lower percentile:', lower_percentile)
print('Upper percentile:', upper_percentile)
```

```
Lower percentile: 3107.8500000000004
Upper percentile: 15312.099999999984
```

In [51]:
```
df_percentile = df[(df['price_per_sqft'] >= lower_percentile) & (df['price_per_s
```

In [53]:
```
df_percentile.describe()
```

Out[53]:

	total_sqft	bath	price	bhk	price_per_sqft
count	11880.000000	11880.000000	11880.000000	11880.000000	11880.000000
mean	1526.834734	2.631397	98.746204	2.732660	6134.521380
std	900.548874	1.172290	88.614835	1.109424	2505.693062
min	276.000000	1.000000	13.500000	1.000000	3108.000000
25%	1108.000000	2.000000	51.180000	2.000000	4380.000000
50%	1290.000000	2.000000	71.000000	3.000000	5438.000000
75%	1670.000000	3.000000	111.000000	3.000000	7024.500000
max	30400.000000	16.000000	2100.000000	16.000000	15311.000000

In [55]:
```
#  IQR Method
```

In [59]:
```
Q1 = df['price_per_sqft'].quantile(0.25)
Q3 = df['price_per_sqft'].quantile(0.75)
IQR = Q3 - Q1
```

In [61]:
```
lower_iqr = Q1 - 1.5 * IQR
upper_iqr = Q3 + 1.5 * IQR
```

In [65]:
```
print('IQR: ', IQR)
print('Lower IQR: ', lower_iqr)
print('Upper IQR: ', upper_iqr)
```

```
IQR:  3050.0
Lower IQR:  -308.0
Upper IQR:  11892.0
```

In [69]:
```
df_iqr = df[(df['price_per_sqft'] >= lower_iqr) & (df['price_per_sqft'] <= upper
```

In [71]:
```
df_iqr.describe()
```

Out[71]:

	total_sqft	bath	price	bhk	price_per_sqft
count	11935.000000	11935.000000	11935.000000	11935.000000	11935.000000
mean	1514.629659	2.533641	87.654926	2.644826	5575.925513
std	1195.959790	1.111145	73.154677	1.051124	1957.779783
min	276.000000	1.000000	8.000000	1.000000	267.000000
25%	1100.000000	2.000000	48.000000	2.000000	4166.000000
50%	1270.000000	2.000000	66.780000	2.000000	5188.000000
75%	1634.500000	3.000000	100.000000	3.000000	6603.000000
max	52272.000000	27.000000	2100.000000	27.000000	11875.000000

In [73]:
```
# Z Score Method
```

In [75]:
```
from scipy import stats
```

In [79]:
```
z_scores = np.abs(stats.zscore(df['price_per_sqft']))
```

In [83]:
```
print('Z score:', z_scores)
```

```
Z score: 0        0.039554
1        0.030971
2        0.033876
3        0.015698
4        0.034391
           ...
13195    0.011538
13196    0.029897
13197    0.024946
13198    0.023300
13199    0.045260
Name: price_per_sqft, Length: 13200, dtype: float64
```

In [81]:
```
df_z_score = df[(z_scores < 3)]
```

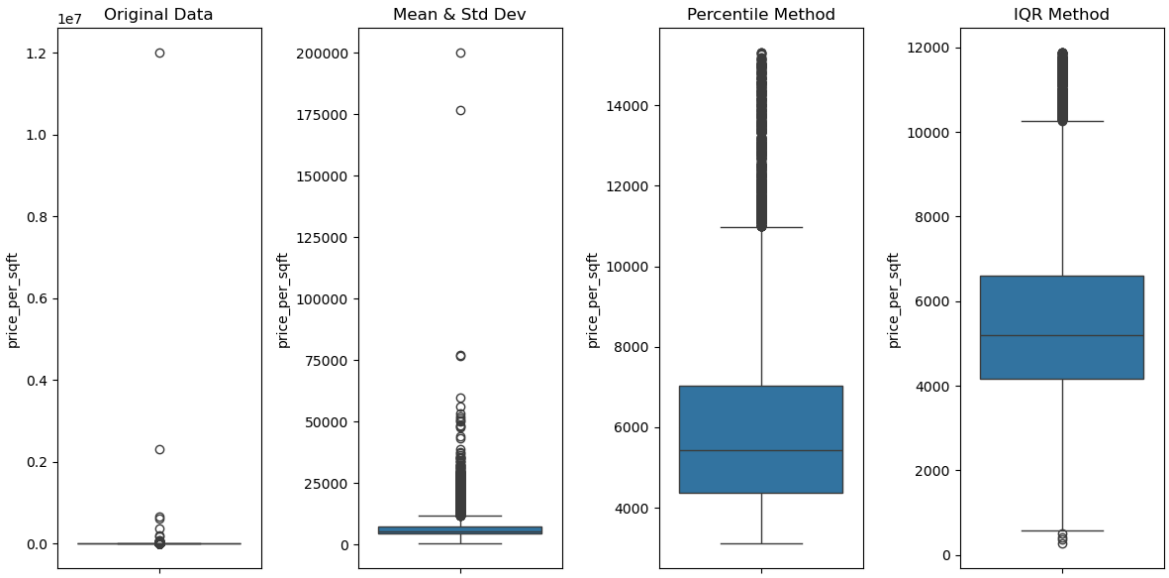
In [85]:
```
df_z_score.describe()
```

Out[85]:

	total_sqft	bath	price	bhk	price_per_sqft
count	13195.000000	13195.00000	13195.000000	13195.000000	13195.000000
mean	1555.884482	2.69064	112.267415	2.800152	6713.708602
std	1237.196807	1.33853	149.200669	1.292344	4876.727718
min	15.000000	1.00000	8.000000	1.000000	267.000000
25%	1100.000000	2.00000	50.000000	2.000000	4266.500000
50%	1275.000000	2.00000	71.740000	3.000000	5434.000000
75%	1672.500000	3.00000	120.000000	3.000000	7313.000000
max	52272.000000	40.00000	3600.000000	43.000000	200000.000000

Q3

In [88]:
```
plt.figure(figsize=(12, 6))

plt.subplot(1, 4, 1)
sns.boxplot(y=df['price_per_sqft'])
plt.title('Original Data')

plt.subplot(1, 4, 2)
sns.boxplot(y=df_mean_std['price_per_sqft'])
plt.title('Mean & Std Dev')

plt.subplot(1, 4, 3)
sns.boxplot(y=df_percentile['price_per_sqft'])
plt.title('Percentile Method')

plt.subplot(1, 4, 4)
sns.boxplot(y=df_iqr['price_per_sqft'])
plt.title('IQR Method')

plt.tight_layout()
plt.show()
```



Q4

In [91]:
```
from scipy.stats import skew, kurtosis
```

In [95]:
```
print("Skewness before:", skew(df['price_per_sqft']))
print("Kurtosis before:", kurtosis(df['price_per_sqft']))
```

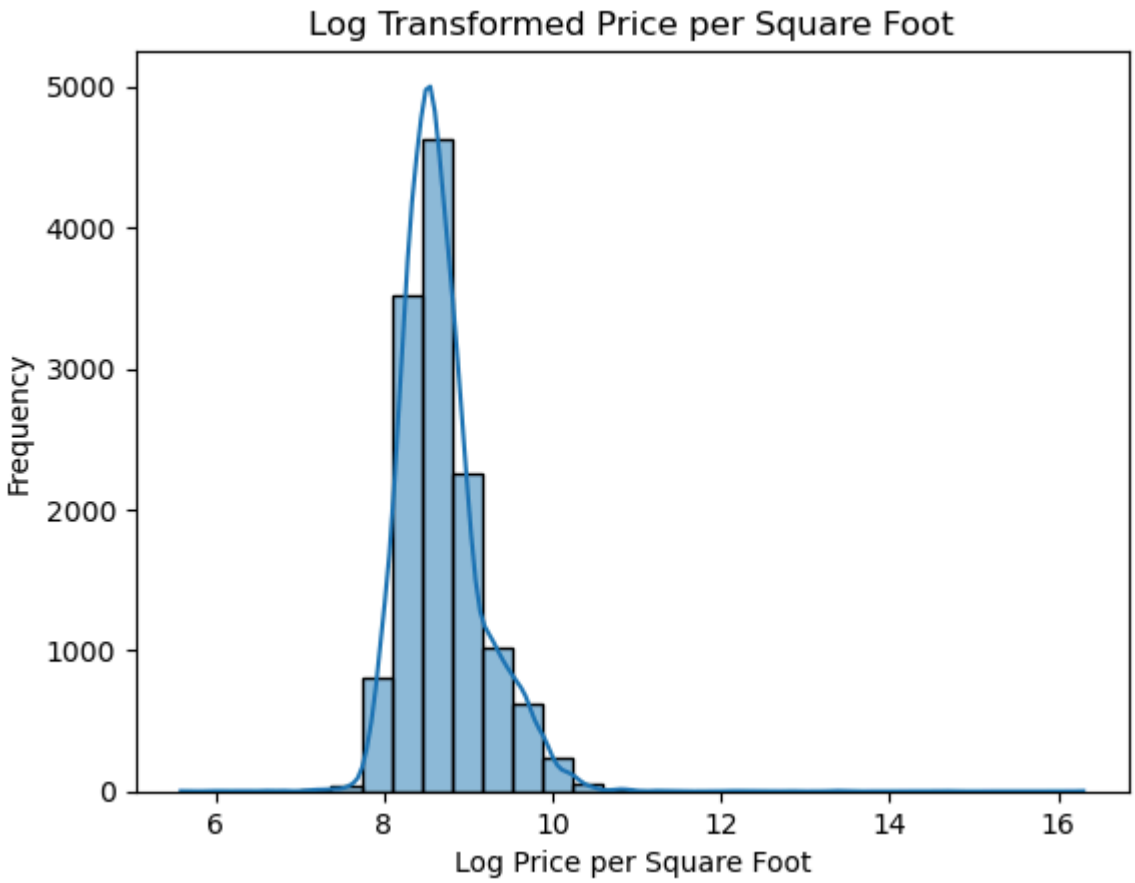
```
Skewness before: 108.26875024325159
Kurtosis before: 12090.633538860382
```

In [97]:
```
df['log_price_per_sqft'] = np.log(df['price_per_sqft'])
```

In [99]:
```
print("Skewness after:", skew(df['log_price_per_sqft']))
print("Kurtosis after:", kurtosis(df['log_price_per_sqft']))
```

```
Skewness after: 1.3997035748119977
Kurtosis after: 9.199636085376468
```

In [101…
```
sb.histplot(df['log_price_per_sqft'], bins=30, kde=True)
plt.title('Log Transformed Price per Square Foot')
plt.xlabel('Log Price per Square Foot')
plt.ylabel('Frequency')
plt.show()
```


Log Transformed Price per Square Foot
Frequency
5000
4000
3000
2000
1000
0
6
8
10
12
14
16
Log Price per Square Foot