AMAZON BEST-SELLER ANALYSIS

SETTING UP THE DATASET

In [1]:

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import seaborn as sns
```

In [2]:

```
bst = pd.read_csv('bestseller.csv')
bst
```

Out[2]:

	Name	Author	User Rating	Reviews	Price	Year	Genre
0	10-Day Green Smoothie Cleanse	JJ Smith	4.7	17350	8	2016	Non Fiction
1	11/22/63: A Novel	Stephen King	4.6	2052	22	2011	Fiction
2	12 Rules for Life: An Antidote to Chaos	Jordan B. Peterson	4.7	18979	15	2018	Non Fiction
3	1984 (Signet Classics)	George Orwell	4.7	21424	6	2017	Fiction
4	5,000 Awesome Facts (About Everything!) (Natio...	National Geographic Kids	4.8	7665	12	2019	Non Fiction
...	...	...	...	...	...	...	...
545	Wrecking Ball (Diary of a Wimpy Kid Book 14)	Jeff Kinney	4.9	9413	8	2019	Fiction
546	You Are a Badass: How to Stop Doubting Your Gr...	Jen Sincero	4.7	14331	8	2016	Non Fiction
547	You Are a Badass: How to Stop Doubting Your Gr...	Jen Sincero	4.7	14331	8	2017	Non Fiction
548	You Are a Badass: How to Stop Doubting Your Gr...	Jen Sincero	4.7	14331	8	2018	Non Fiction
549	You Are a Badass: How to Stop Doubting Your Gr...	Jen Sincero	4.7	14331	8	2019	Non Fiction

550 rows × 7 columns

DATA CLEANING AND TRANSFORMATION

1. Is there any missing data?

In [3]:

```
bst.isnull().sum()
```

Out[3]:

```
Name           0
Author         0
User Rating    0
Reviews        0
Price          0
Year           0
Genre          0
```

```
dtype: int64
```

1. **Are there any duplicate**

In [4]:

```
bst.duplicated().sum()
```

Out[4]:

```
0
```

DATA VISUALISATION

1. **Create a plot showing the top 10 authors by rating**

In [5]:

```
authors_rating = bst.pivot_table(index='Author', values='User Rating', aggfunc='mean')
sorted_rating = authors_rating.sort_values(by='User Rating', ascending=False)
sorted_rating.head(10)
```

Out[5]:

Author	User Rating
Patrick Thorpe	4.9
Lin-Manuel Miranda	4.9
Chip Gaines	4.9
Sherri Duskey Rinker	4.9
Nathan W. Pyle	4.9
Pete Souza	4.9
Sarah Young	4.9
Bill Martin Jr.	4.9
Dav Pilkey	4.9
Rush Limbaugh	4.9

1. **Create a pie chart showing the distribution of book genre.**

In [6]:

```
genre_count = bst['Genre'].value_counts()
genre_count
```

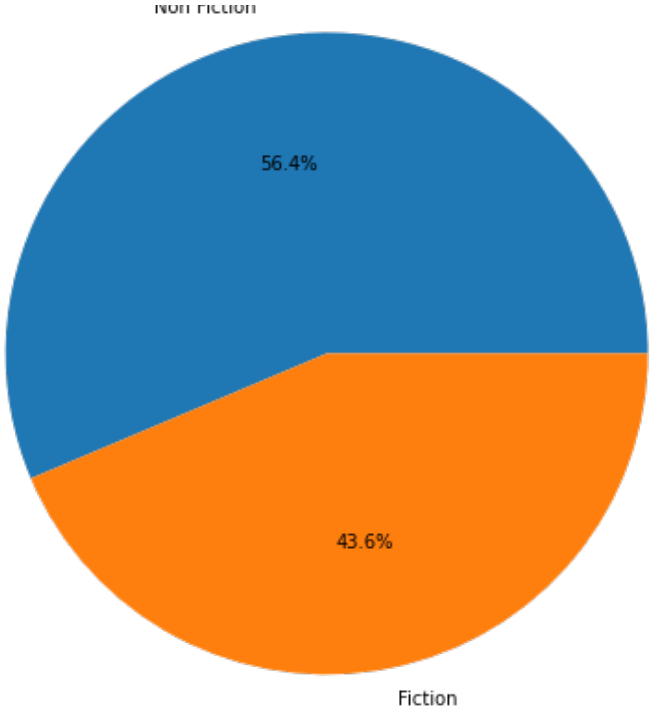
Out[6]:

```
Non Fiction    310
Fiction        240
Name: Genre, dtype: int64
```

In [7]:

```
fig = plt.figure(figsize=(10,8))
plt.pie(genre_count, labels=genre_count.index, autopct='%1.1f%%')

plt.title('Distribution of Book Genre', weight='bold')
plt.show()
```



1. **Create a plot showing the top 5 books by number of reviews.**

In [8]:

```
books_review = bst.pivot_table(index='Name', values='Reviews')
review_sort = books_review.sort_values(by='Reviews', ascending=False)
top5_books = review_sort.head(5)
top5_books
```

Out[8]:

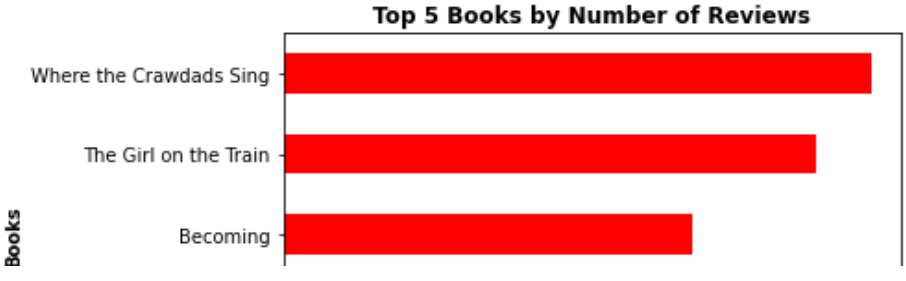
Name	Reviews
Where the Crawdads Sing	87841.0
The Girl on the Train	79446.0
Becoming	61133.0
Gone Girl	57271.0
The Fault in Our Stars	50482.0

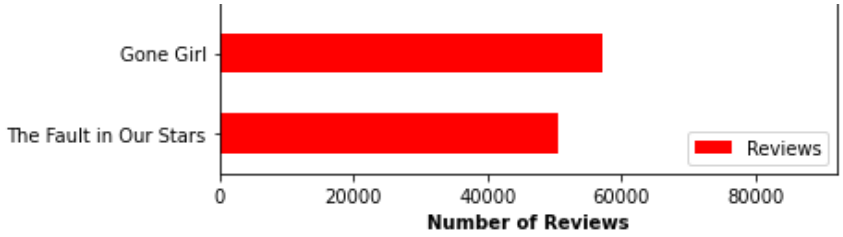
In [9]:

```
top5_books = top5_books[::-1]
plt.figure(figsize=(10,8))

top5_books.plot(kind='barh', color='red')
plt.xlabel('Number of Reviews', weight='bold')
plt.ylabel('Books', weight='bold')
plt.title('Top 5 Books by Number of Reviews', weight='bold')
plt.show()
```

```
<Figure size 720x576 with 0 Axes>
```





1. **Are there any outliers?**

In [10]:

```
# Compute z-score for each numerical column
z_score = pd.DataFrame(np.abs((bst.select_dtypes(include=np.number) - bst.select_dtypes(
include=np.number).mean()) / bst.select_dtypes(include=np.number).std()))

# Set a threshold for outlier detection (e.g., z-score greater than 3)
threshold = 3

# Identify outliers by checking which Z-scores exceed the threshold
outliers = bst[z_score > threshold].dropna(how='all')
outliers
```

Out[10]:

	Name	Author	User Rating	Reviews	Price	Year	Genre
22	NaN	NaN	3.9	NaN	NaN	NaN	NaN
32	NaN	NaN	NaN	61133.0	NaN	NaN	NaN
33	NaN	NaN	NaN	61133.0	NaN	NaN	NaN
69	NaN	NaN	NaN	NaN	105.0	NaN	NaN
70	NaN	NaN	NaN	NaN	105.0	NaN	NaN
106	NaN	NaN	3.8	47265.0	NaN	NaN	NaN
107	NaN	NaN	3.8	47265.0	NaN	NaN	NaN
132	NaN	NaN	3.6	NaN	NaN	NaN	NaN
135	NaN	NaN	NaN	57271.0	NaN	NaN	NaN
136	NaN	NaN	NaN	57271.0	NaN	NaN	NaN
137	NaN	NaN	NaN	57271.0	NaN	NaN	NaN
151	NaN	NaN	NaN	NaN	54.0	NaN	NaN
159	NaN	NaN	NaN	NaN	52.0	NaN	NaN
271	NaN	NaN	NaN	NaN	46.0	NaN	NaN
272	NaN	NaN	NaN	NaN	46.0	NaN	NaN
273	NaN	NaN	NaN	NaN	46.0	NaN	NaN
274	NaN	NaN	NaN	NaN	46.0	NaN	NaN
275	NaN	NaN	NaN	NaN	46.0	NaN	NaN
276	NaN	NaN	NaN	NaN	46.0	NaN	NaN
277	NaN	NaN	NaN	NaN	46.0	NaN	NaN
278	NaN	NaN	NaN	NaN	46.0	NaN	NaN
279	NaN	NaN	NaN	NaN	46.0	NaN	NaN
280	NaN	NaN	NaN	NaN	46.0	NaN	NaN
346	NaN	NaN	NaN	NaN	53.0	NaN	NaN
353	NaN	NaN	3.3	NaN	NaN	NaN	NaN
365	NaN	NaN	NaN	50482.0	NaN	NaN	NaN
366	NaN	NaN	NaN	50482.0	NaN	NaN	NaN

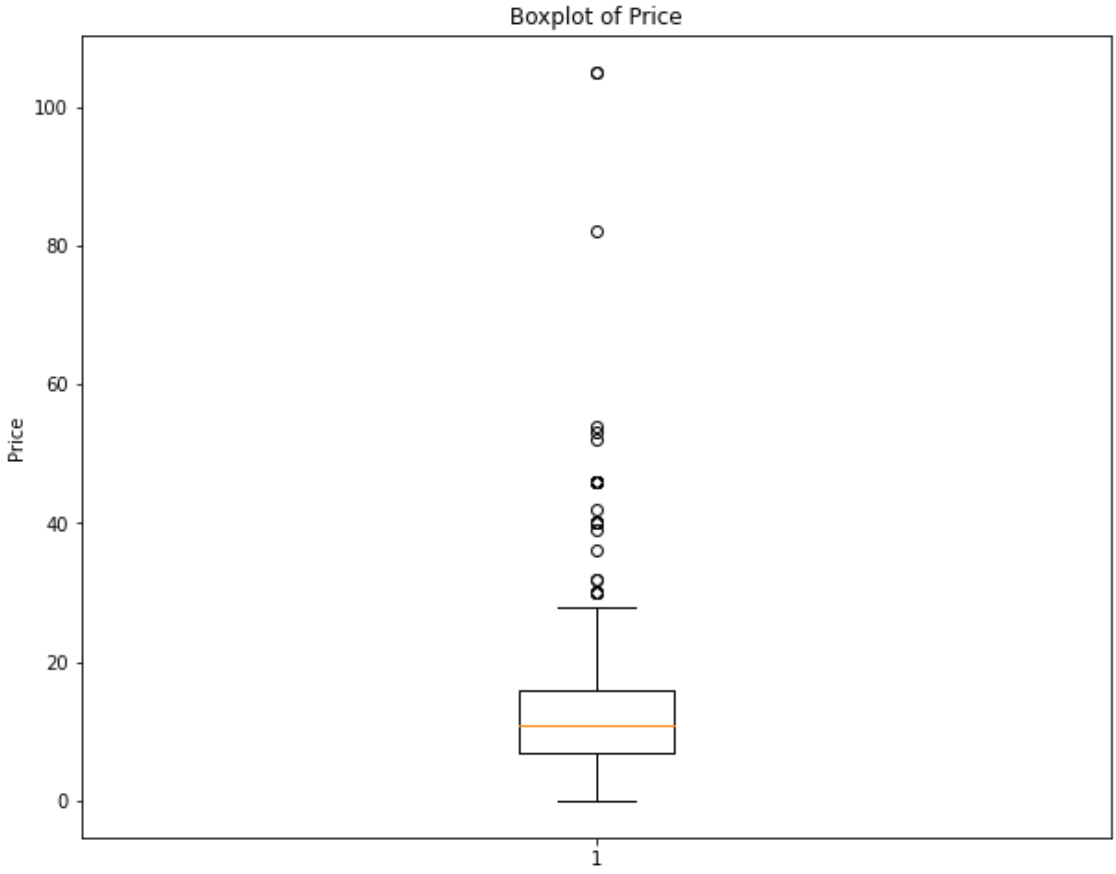
367	NaN	Author	User Rating	Reviews	Price	Year	Genre
368	NaN	NaN	NaN	50482.0	NaN	NaN	NaN
382	NaN	NaN	NaN	79446.0	NaN	NaN	NaN
383	NaN	NaN	NaN	79446.0	NaN	NaN	NaN
392	NaN	NaN	3.9	NaN	NaN	NaN	NaN
393	NaN	NaN	3.9	NaN	NaN	NaN	NaN
437	NaN	NaN	NaN	49288.0	NaN	NaN	NaN
438	NaN	NaN	NaN	49288.0	NaN	NaN	NaN
473	NaN	NaN	NaN	NaN	82.0	NaN	NaN
534	NaN	NaN	NaN	87841.0	NaN	NaN	NaN

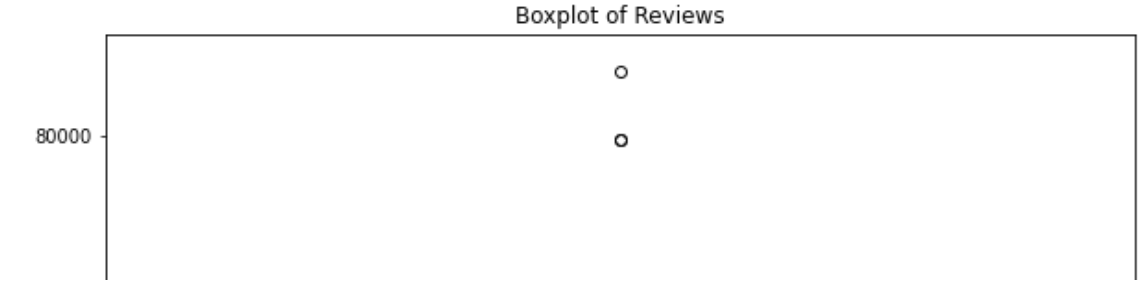
In [11]:

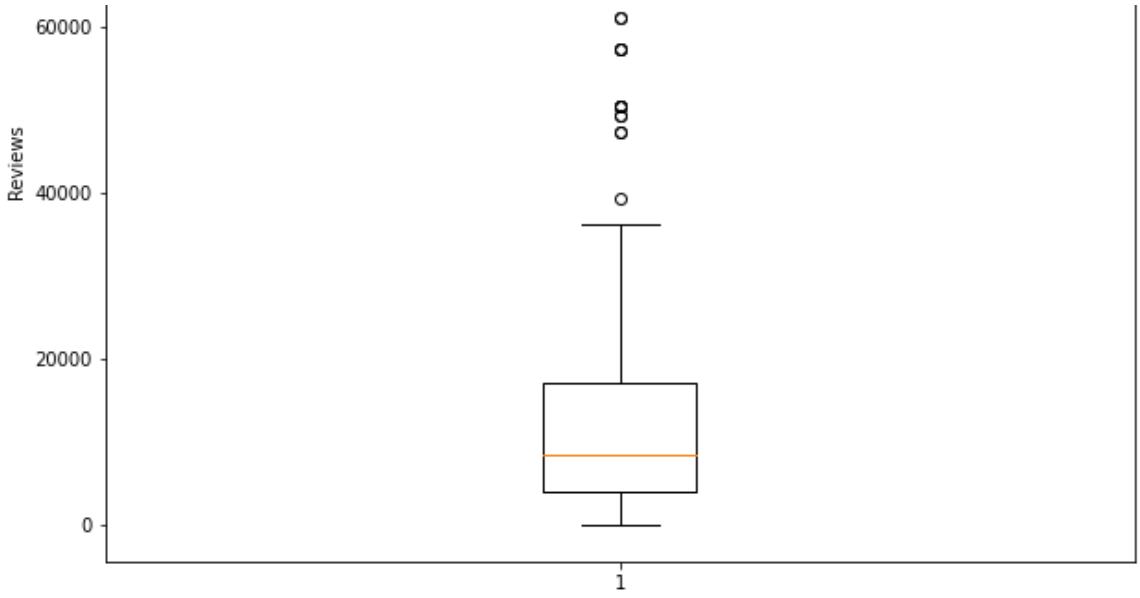
```
# Selecting only numerical columns
columns_to_plot = ['Price', 'Reviews', 'User Rating']
numeric_columns = bst[columns_to_plot]
```

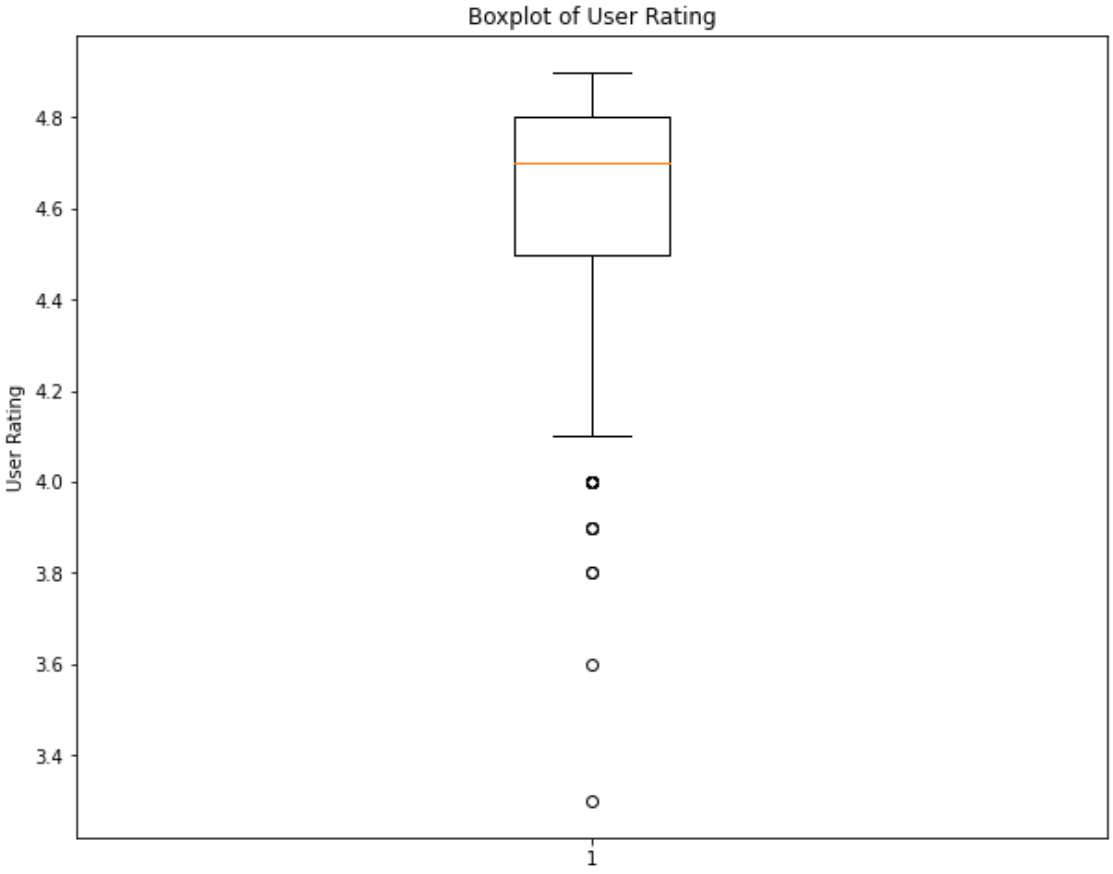
In [12]:

```
# Plot a box plots for numerical columns to visualise outliers
for column in columns_to_plot:
    plt.figure(figsize=(10,8))
    plt.boxplot(bst[column])
    plt.title(f'Boxplot of {column}')
    plt.ylabel(column)
    plt.show
```









1. What is the average price of amazon bestsellers over time

In [13]:

```
revenue = bst.pivot_table(index='Year', values='Price', aggfunc='mean')
sorted_revenue = revenue.sort_values(by='Year')
sorted_revenue
```

Out[13]:

Year	Price
2009	15.40
2010	13.48
2011	15.10
2012	15.30
2013	14.60

Year	Price
2014	14.64
2015	10.42
2016	13.18
2017	11.38
2018	10.52
2019	10.08

In [14]:

```
plt.figure(figsize=(10,8))
sorted_revenue.plot(kind='line')
plt.xlabel('Year', weight='bold')
plt.ylabel('Average Price (USD)', weight='bold')
plt.title('Trends in Average Price of Amazone Bestsellers Across the Years', weight='bold
')
plt.show()
```

```
<Figure size 720x576 with 0 Axes>
```

1. **Is there any correlation between user rating and average price of amazon bestsellers.**

In [15]:

```
grouped = bst.groupby('Year').agg({'Price':'mean', 'User Rating':'mean'})
grouped['User Rating'] = grouped['User Rating'].apply(lambda x: round(x,2))
grouped
```

Out[15]:

Year	Price	User Rating
2009	15.40	4.58
2010	13.48	4.56
2011	15.10	4.56
2012	15.30	4.53
2013	14.60	4.55
2014	14.64	4.62
2015	10.42	4.65
2016	13.18	4.68
2017	11.38	4.66
2018	10.52	4.67

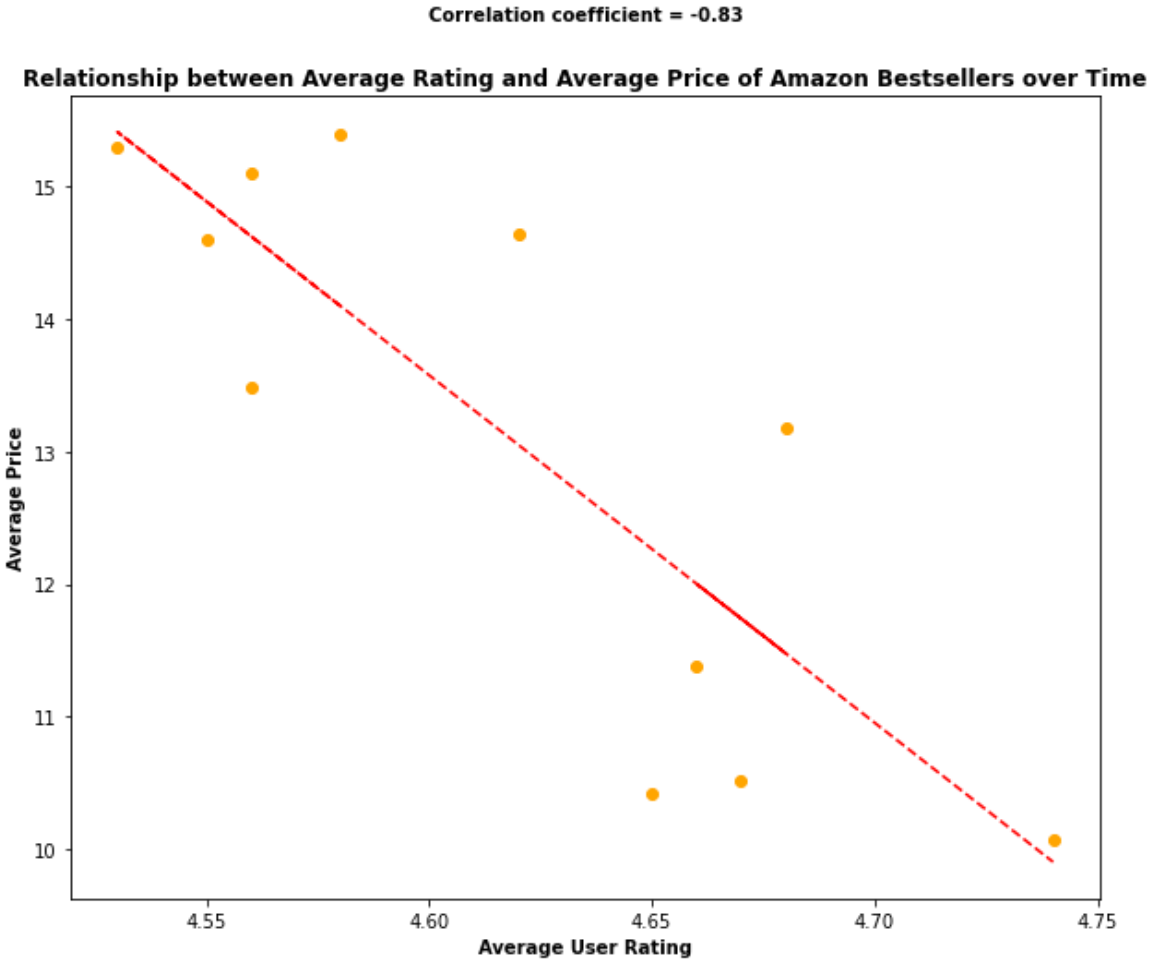
	Price	User Rating
2019	10.08	4.74

In [16]:

```
x = grouped['User Rating']
y = grouped['Price']

plt.figure(figsize=(10,8))
plt.scatter(x, y, color='orange')
z = np.polyfit(x, y, 1)
p = np.poly1d(z)
plt.plot(x, p(x), 'r--')
corr_coef = np.corrcoef(x, y)[1, 0]


plt.xlabel('Average User Rating', weight='bold')
plt.ylabel('Average Price', weight='bold')
plt.title('Relationship between Average Rating and Average Price of Amazon Bestsellers ov
er Time', weight='bold')
plt.text(0.5, 1.1, f"Correlation coefficient = {corr_coef:.2f}", ha='center', va='center
', weight='bold', transform=plt.gca().transAxes)
plt.show()
```



1. **Trend of total user engagement across the years.**

In [17]:

```
user_engagement = bst.pivot_table(index='Year', values='Reviews', aggfunc='sum')
sorted_user_engagement = user_engagement.sort_values(by='Year')
sorted_user_engagement
```

Out[17]:

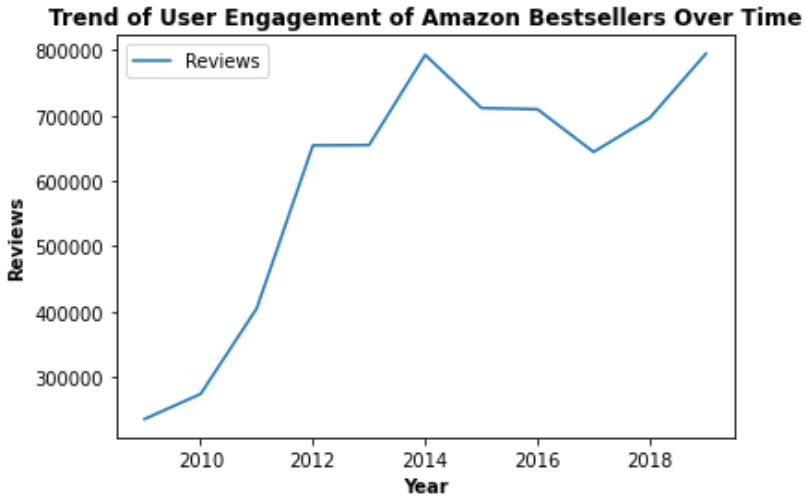
Year	Reviews
2009	235506

Year	Reviews
2010	273981
2011	405041
2012	654546
2013	654907
2014	792997
2015	711669
2016	709800
2017	644420
2018	696521
2019	794917

In [18]:

```
plt.figure(figsize=(10,8))
sorted_user_engagement.plot(kind='line')
plt.xlabel('Year', weight='bold')
plt.ylabel('Reviews', weight='bold')
plt.title('Trend of User Engagement of Amazon Bestsellers Over Time', weight='bold')
plt.show()
```

```
<Figure size 720x576 with 0 Axes>
```



1. **Is there any relationship between average user rating, average price and user_engagement over time**

In [19]:

```
grouped_2 = bst.groupby('Year').agg({'Price':'mean', 'User Rating':'mean', 'Reviews':'sum'})
grouped_2['User Rating'] = grouped['User Rating'].apply(lambda x: round(x,2))
grouped_2
```

Out[19]:

Year	Price	User Rating	Reviews
2009	15.40	4.58	235506
2010	13.48	4.56	273981
2011	15.10	4.56	405041
2012	15.30	4.53	654546
2013	14.60	4.55	654907
2014	14.64	4.62	792997
2015	10.42	4.65	711669

Year	Price	User Rating	Reviews
2016	13.18	4.68	709808
2017	11.38	4.66	644420
2018	10.52	4.67	696521
2019	10.08	4.74	794917

In [23]:

```
x = grouped_2['User Rating']
y = grouped_2['Price']
z = grouped_2['Reviews']

plt.figure(figsize=(10,8))
sns.scatterplot(x, y, z, size=z, sizes=(30,400))

plt.xlabel('Ratings', weight='bold')
plt.ylabel('Price', weight='bold')
plt.title('Relationship between Average User Ratings, Average Price and User Engagement over Time', weight='bold')
```

```
c:\Python\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variables as keyword args: x, y, hue. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[23]:

```
Text(0.5, 1.0, 'Relationship between Average User Ratings, Average Price and User Engagement over Time')
```