Importing libraries

In [89]:

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

Loading Data

In [90]:

```
df = pd.read_csv("D:\\joti\\projects\\codealpha_tasks\\sales_prediction\\dataset\\Advertising.csv")
```

Data Cleaning

In [91]:

```
df.head()
```

Out[91]:

	Unnamed: 0	TV	Radio	Newspaper	Sales
0	1	230.1	37.8	69.2	22.1
1	2	44.5	39.3	45.1	10.4
2	3	17.2	45.9	69.3	9.3
3	4	151.5	41.3	58.5	18.5
4	5	180.8	10.8	58.4	12.9

In [92]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   Unnamed: 0  200 non-null    int64  
 1   TV          200 non-null    float64
 2   Radio       200 non-null    float64
 3   Newspaper   200 non-null    float64
 4   Sales       200 non-null    float64
dtypes: float64(4), int64(1)
memory usage: 7.9 KB
```

In [93]:

```
df.columns
```

Out[93]:

```
Index(['Unnamed: 0', 'TV', 'Radio', 'Newspaper', 'Sales'], dtype='object')
```

In [94]:

```
df.describe()
```

Out[94]:

	Unnamed: 0	TV	Radio	Newspaper	Sales
count	200.000000	200.000000	200.000000	200.000000	200.000000
mean	100.500000	147.042500	23.264000	30.554000	14.022500
std	57.879185	85.854236	14.846809	21.778621	5.217457
min	1.000000	0.700000	0.000000	0.300000	1.600000
25%	50.750000	74.375000	9.975000	12.750000	10.375000
50%	100.500000	149.750000	22.900000	25.750000	12.900000
75%	150.250000	218.825000	36.525000	45.100000	17.400000
max	200.000000	296.400000	49.600000	114.000000	27.000000

In [95]:

```
# drop extra columns
df.drop(columns = ["Unnamed: 0"], inplace = True)
```

In [96]:

```
df.columns
```

Out[96]:

```
Index(['TV', 'Radio', 'Newspaper', 'Sales'], dtype='object')
```

In [97]:

```
# checking missing values
df.isnull().sum()
```

Out[97]:

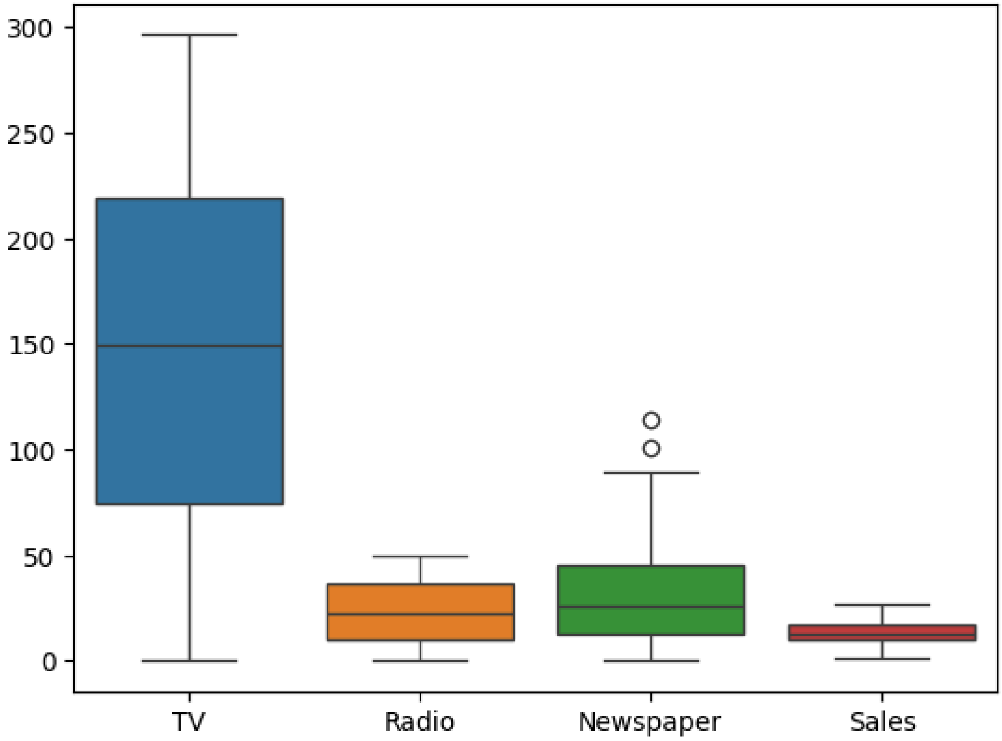
```
TV           0
Radio        0
Newspaper    0
Sales        0
dtype: int64
```

In [98]:

```
# checking duplicates
df.duplicated().sum()
df.drop_duplicates(inplace=True)
```

In [99]:

```
# checking outliers
sns.boxplot(data=df)
plt.show()
```



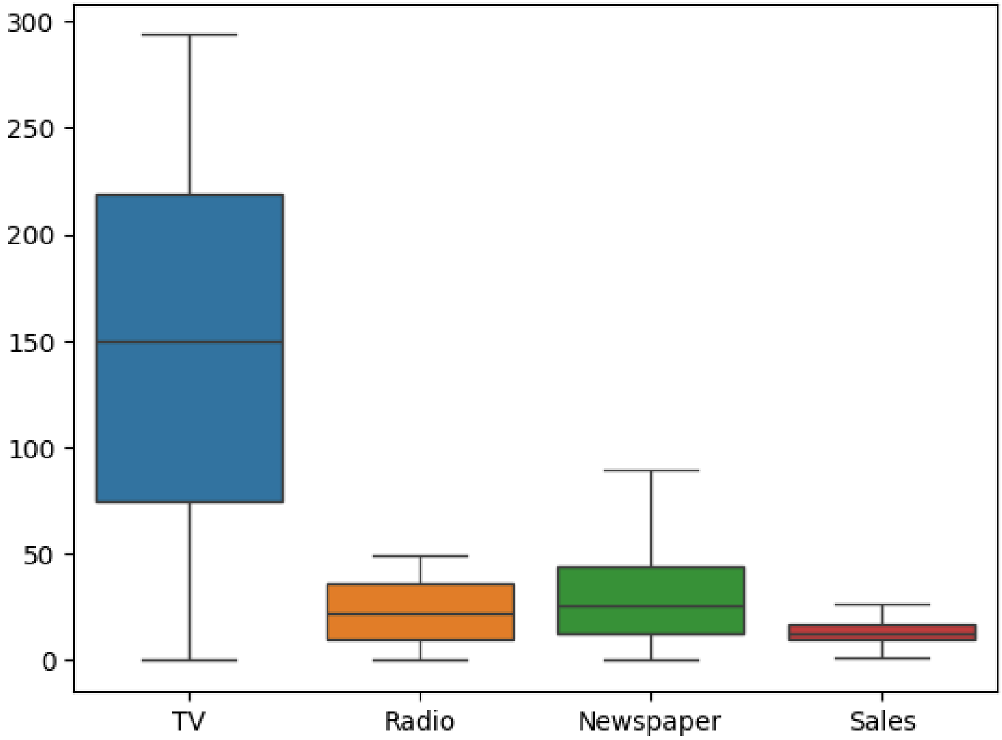
In [100…

```
# remove outliers
Q1 = df.quantile(0.25)
Q3 = df.quantile(0.75)
IQR = Q3 - Q1

df = df[~((df < (Q1 - 1.5 * IQR)) | (df > (Q3 + 1.5 * IQR))).any(axis=1)]
```

In [101…

```
sns.boxplot(data=df)
plt.show()
```



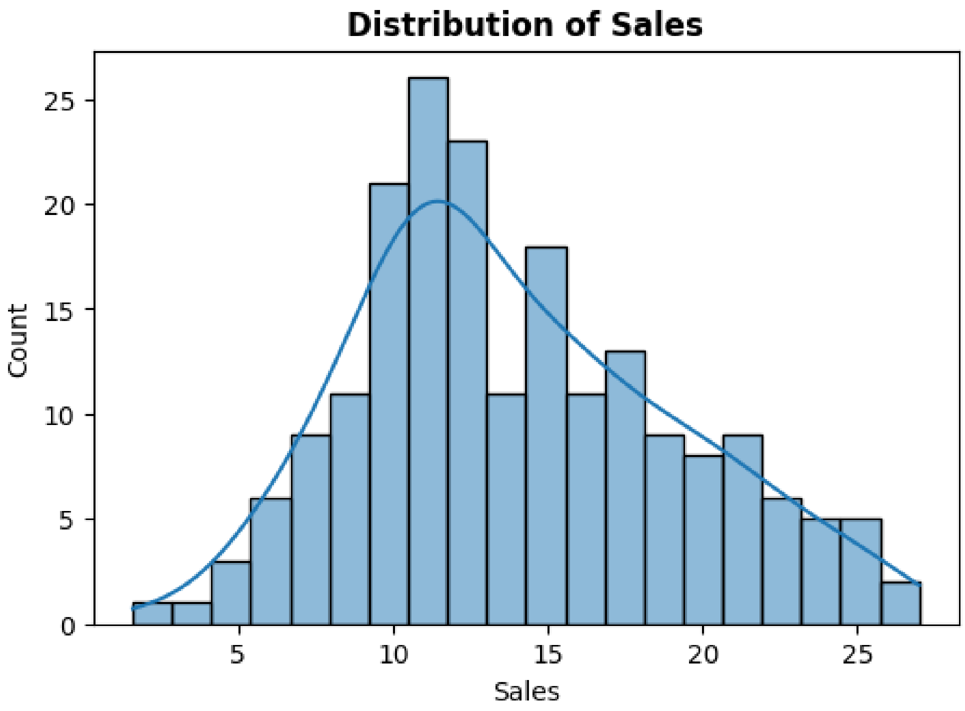
In [102…

```
# save cleaned dataset
df.to_csv("Cleaned_Sales_Prediction.csv", index = False)
```

Exploratory Data Analysis

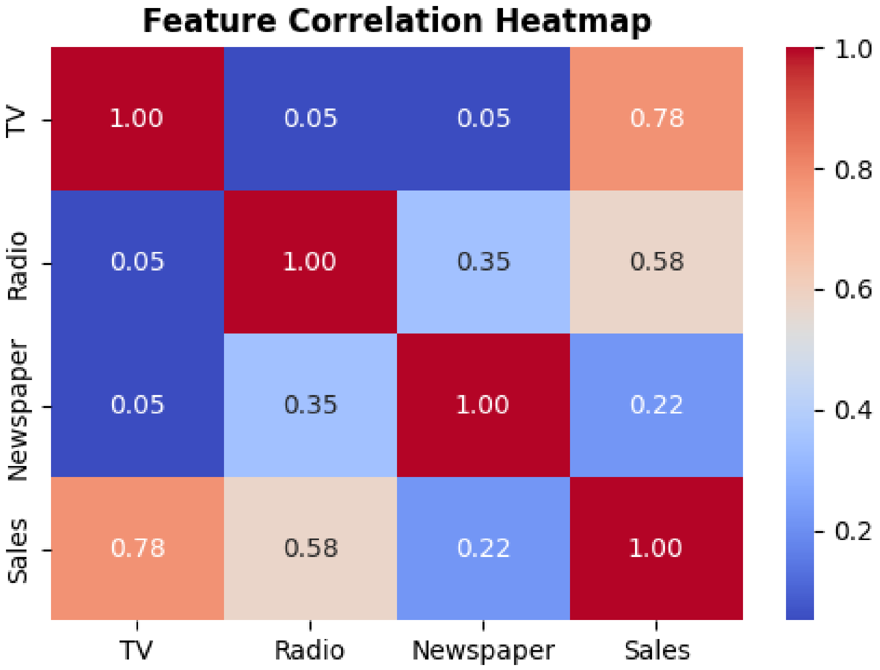
In [103…

```
plt.figure(figsize=(6,4))
sns.histplot(df["Sales"], bins=20, kde=True)
plt.title("Distribution of Sales",fontweight = "bold")
plt.show()
```



In [104…

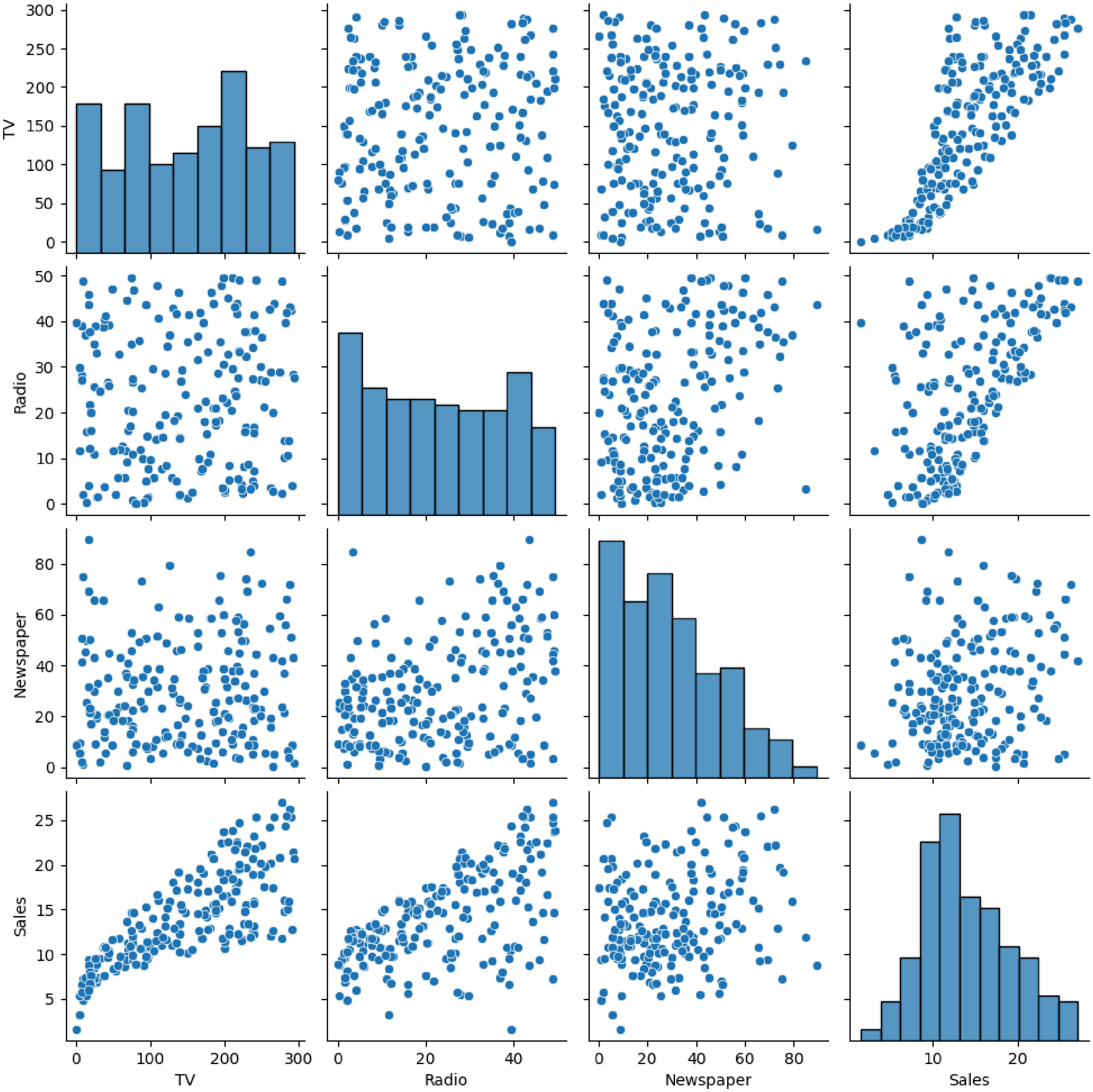
```
plt.figure(figsize=(6,4))
sns.heatmap(df.corr(), annot=True, cmap="coolwarm", fmt=".2f")
plt.title("Feature Correlation Heatmap",fontweight = "bold")
plt.show()
```



	TV	Radio	Newspaper	Sales
TV	1.00	0.05	0.05	0.78
Radio	0.05	1.00	0.35	0.58
Newspaper	0.05	0.35	1.00	0.22
Sales	0.78	0.58	0.22	1.00

In [105…

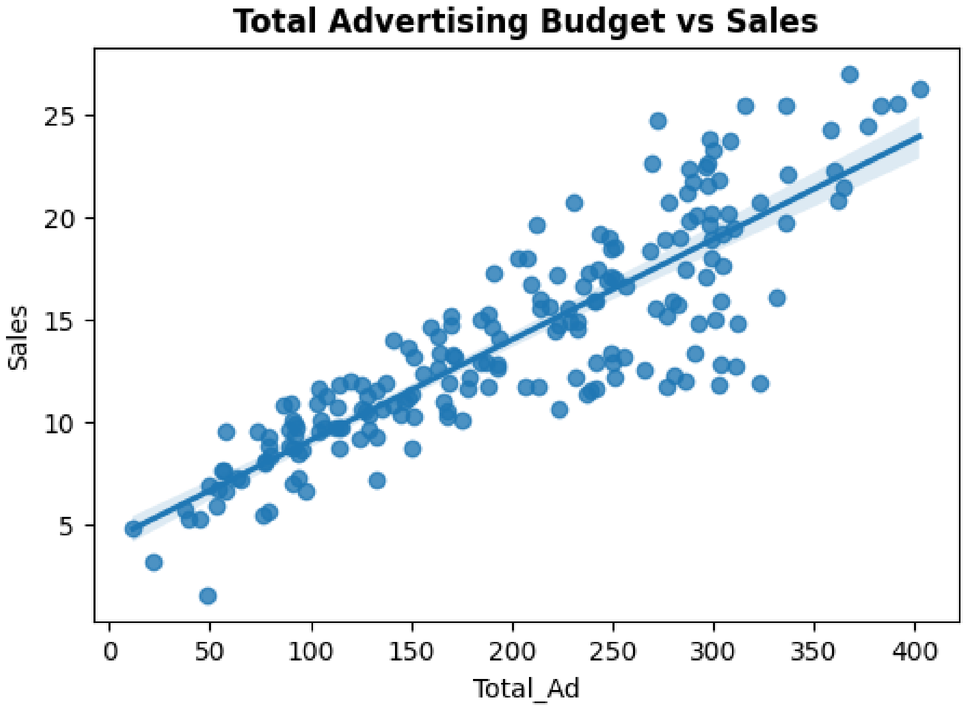
```
sns.pairplot(df)
plt.show()
```



In [106…

```python
df["Total_Ad"] = df["TV"] + df["Radio"] + df["Newspaper"]

plt.figure(figsize=(6,4))
sns.regplot(x=df["Total_Ad"], y=df["Sales"])
plt.title("Total Advertising Budget vs Sales",fontweight = "bold")
plt.show()
```


Total Advertising Budget vs Sales
Sales
25
20
15
10
5
0
50
100
150
200
250
300
350
400
Total_Ad

```
In [ ]:
```