Import necessory libraries

In [ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
```

Loading the data

In [ ]:
```
sales_data = pd.read_csv('Advertising.csv',index_col='Unnamed: 0')
```

In [ ]:
```
sales_data.head()
```

Out[ ]:

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

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In [ ]:
```
sales_data.shape
```

Out[ ]:
```
(200, 4)
```

In [ ]:
```
# check if any null value in data
sales_data.isnull().sum()
```

Out[ ]:
```
TV           0
Radio        0
Newspaper    0
Sales        0
dtype: int64
```

In [ ]:
```
sales_data.describe()
```

Out[ ]:

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

In [ ]:
```
# check for duplicate values in dataset
sales_data.duplicated().sum()
```

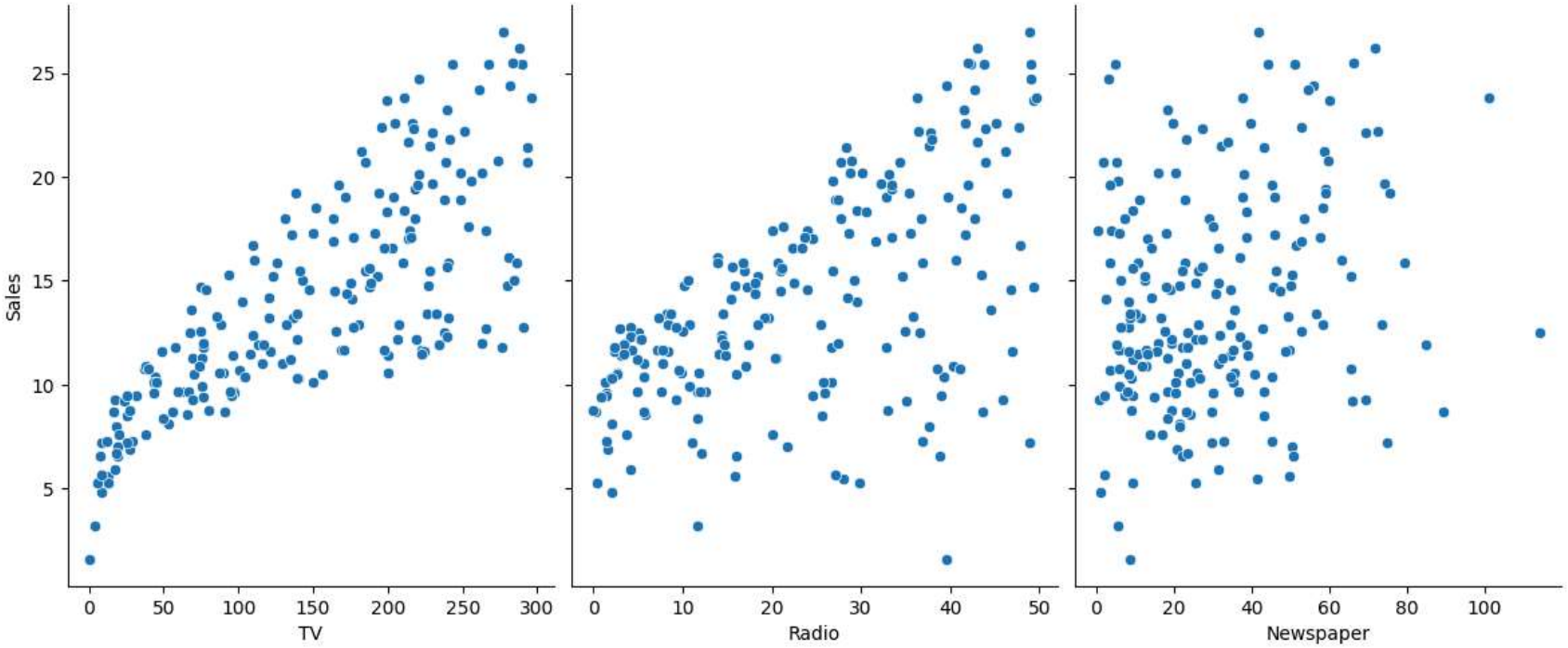
Out[ ]:
```
0
```

In [ ]:
```
sales_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 200 entries, 1 to 200
Data columns (total 4 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   TV         200 non-null    float64
 1   Radio      200 non-null    float64
 2   Newspaper  200 non-null    float64
 3   Sales      200 non-null    float64
dtypes: float64(4)
memory usage: 7.8 KB
```

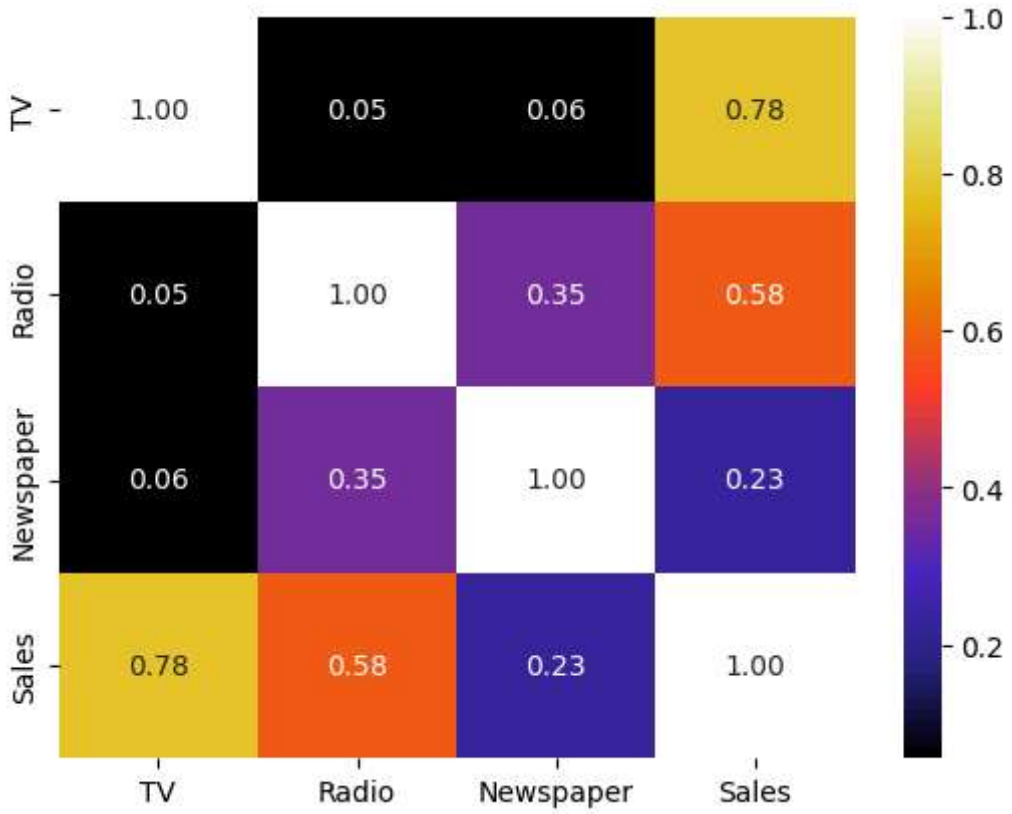
Now visualize the Data

In [ ]:
```
sns.pairplot(sales_data, x_vars=['TV', 'Radio', 'Newspaper'], y_vars='Sales', height=5, aspect=0.8)
plt.show()
```



Check correlation between data

In [ ]:
```
#Correlation matrix
corr_matrix = sales_data.corr()
sns.heatmap(corr_matrix, annot=True, cmap='CMRmap', fmt='.2f')
plt.show()
```



In [ ]:
```
corr_matrix
```

Out[ ]:

	TV	Radio	Newspaper	Sales
TV	1.000000	0.054809	0.056648	0.782224
Radio	0.054809	1.000000	0.354104	0.576223
Newspaper	0.056648	0.354104	1.000000	0.228299
Sales	0.782224	0.576223	0.228299	1.000000

Now train the model

- split the dataset

In [ ]:
```
X = sales_data[['TV', 'Radio', 'Newspaper']]
y = sales_data['Sales']
```

In [ ]:
```
# Split data into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=7)
```

- Choose and train the model

In [ ]:
```
model = LinearRegression()
```

In [ ]:
```
model.fit(X_train,y_train)
```

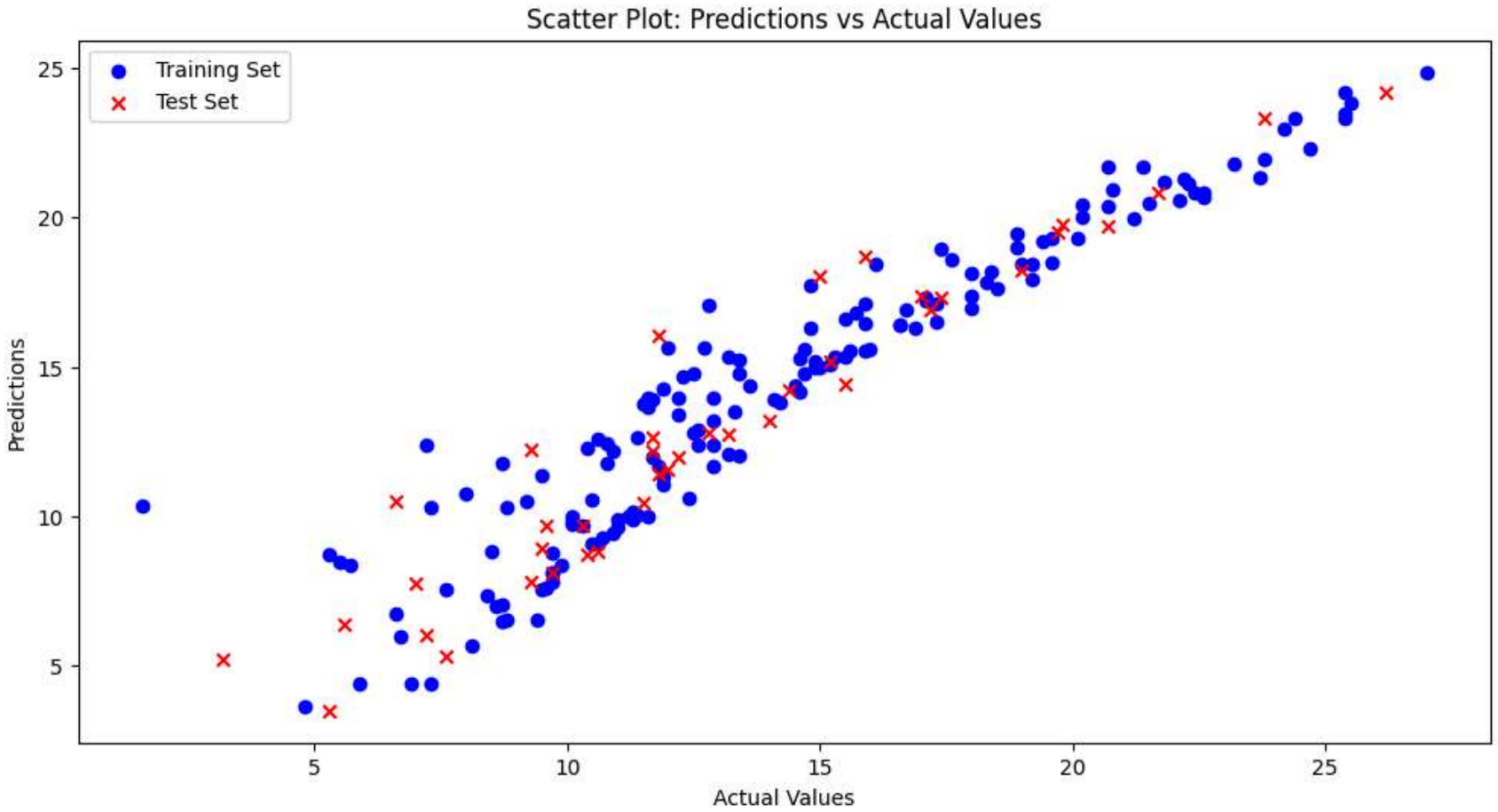
Out[ ]:
```
▾ LinearRegression
LinearRegression()
```

make prediction

In [ ]:
```
# Make predictions on the training set
train_predictions = model.predict(X_train)
```

In [ ]:
```
# Make predictions on the testing set
test_predictions = model.predict(X_test)
```

In [ ]:
```
# Scatter plot for both training and test set predictions
plt.figure(figsize=(12, 6))
plt.scatter(y_train, train_predictions, c='blue', label='Training Set', marker='o')
plt.scatter(y_test, test_predictions, c='red', label='Test Set', marker='x')
plt.title('Scatter Plot: Predictions vs Actual Values')
plt.xlabel('Actual Values')
plt.ylabel('Predictions')
plt.legend()
plt.show()
```



- Model evalution

In [ ]:
```
print(f''' The train accuracy : {r2_score(y_train,train_predictions)}
The test accuracy : {r2_score(y_test , test_predictions)}''')
```

```
 The train accuracy : 0.8929164670647455
The test accuracy : 0.9095550600904052
```