

LINEAR REGRESSION

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

```
df = pd.read_csv('Advertising.csv')
```

```
df.head()
```

	TV	radio	newspaper	sales
0	230.1	37.8	69.2	22.1
1	44.5	39.3	45.1	10.4
2	17.2	45.9	69.3	9.3
3	151.5	41.3	58.5	18.5
4	180.8	10.8	58.4	12.9

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
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: 6.4 KB
```

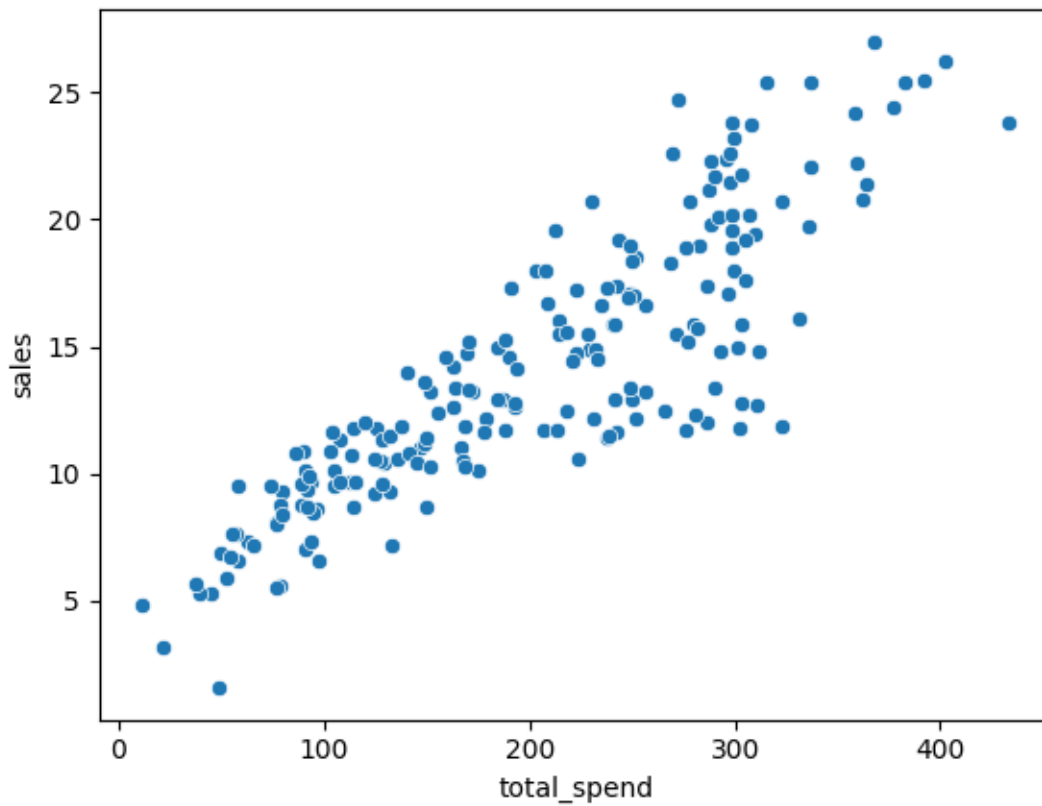
```
df['total_spend'] = df['TV'] + df['radio'] + df['newspaper']
```

```
df.head()
```

	TV	radio	newspaper	sales	total_spend
0	230.1	37.8	69.2	22.1	337.1
1	44.5	39.3	45.1	10.4	128.9
2	17.2	45.9	69.3	9.3	132.4
3	151.5	41.3	58.5	18.5	251.3
4	180.8	10.8	58.4	12.9	250.0

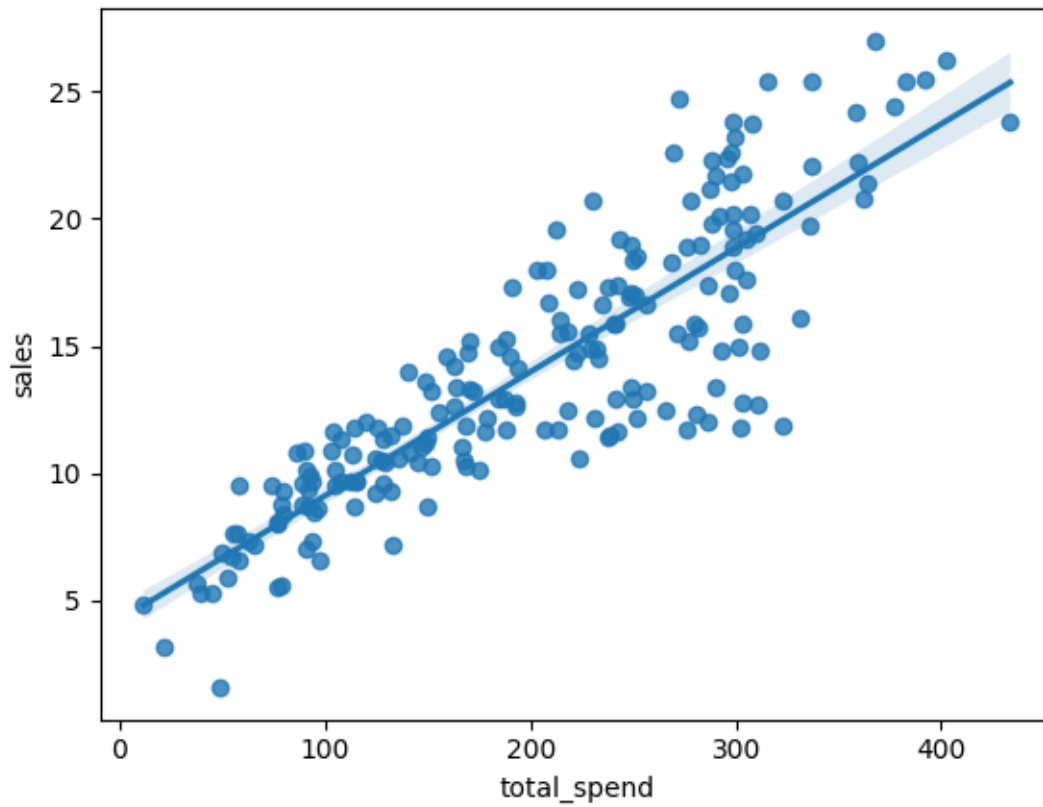
```
sns.scatterplot(data=df,x='total_spend',y='sales')
```

```
<Axes: xlabel='total_spend', ylabel='sales'>
```



```
sns.regplot(data=df,x='total_spend',y='sales')
```

```
<Axes: xlabel='total_spend', ylabel='sales'>
```



```
X = df['total_spend']  
y = df['sales']
```

```
# y = mx + b  
# y = B1x + B0  
# help(np.polyfit)
```

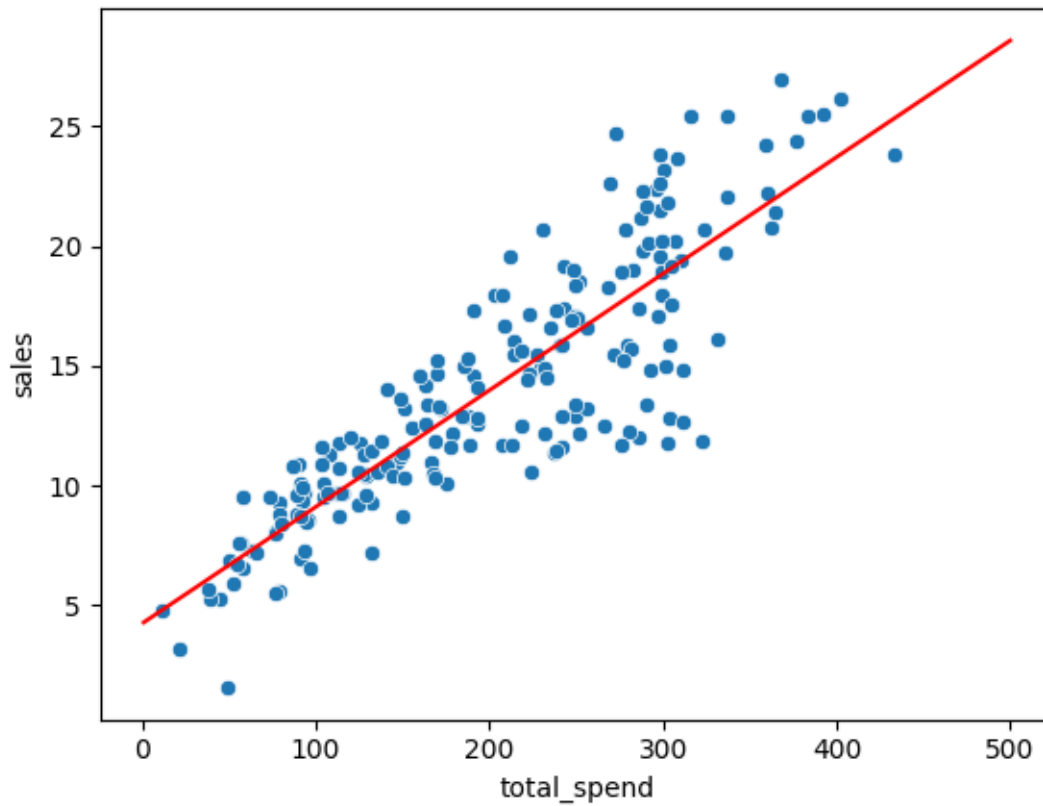
```
np.polyfit(x=X,y=y,deg=1)
```

```
array([0.04868788, 4.24302822])
```

```
potential_spend = np.linspace(1,500,100)
```

```
preditec_sales = 0.04868788*potential_spend + 4.24302822
```

```
sns.scatterplot(data=df,x='total_spend',y='sales')
plt.plot(potential_spend, preditec_sales,color='red')
```



```
spend = 200

predicted_sales = 0.04868788*spend + 4.24302822
predicted_sales
```

13.98060422

```
np.polyfit(x=X,y=y,deg=3) # Equation of degree 3
```

array([3.07615033e-07, -1.89392449e-04, 8.20886302e-02, 2.70495053e+00])

```
# y = B1x + B0
```

```
# y = B3*x**3 + B2*x**2 + B1*x + B0
```

```
potential_spend = np.linspace(0,500,100)
```

```
pred_sales = 3.07615033e-07*potential_spend**3 + -1.89392449e-04*potential_spend**2 + 8.20
```

```
sns.scatterplot(data=df,x='total_spend',y='sales')
```

```
plt.plot(potential_spend, pred_sales,color='red')
```

