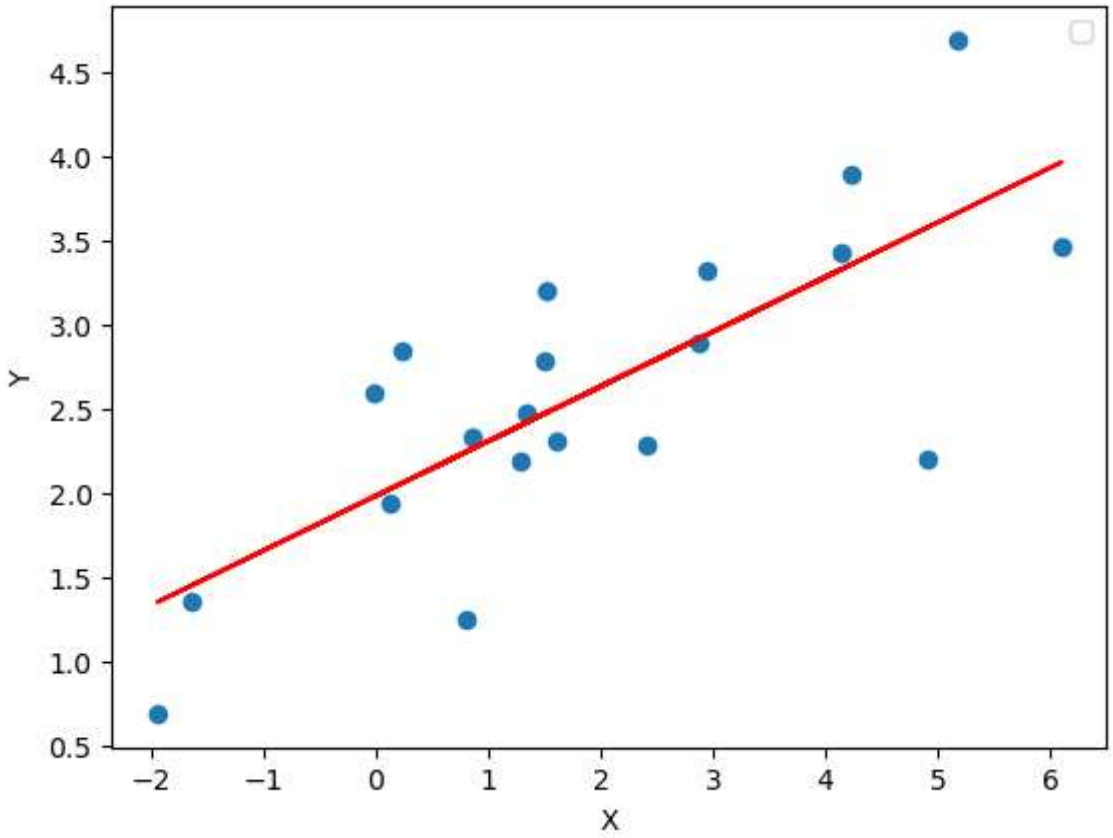
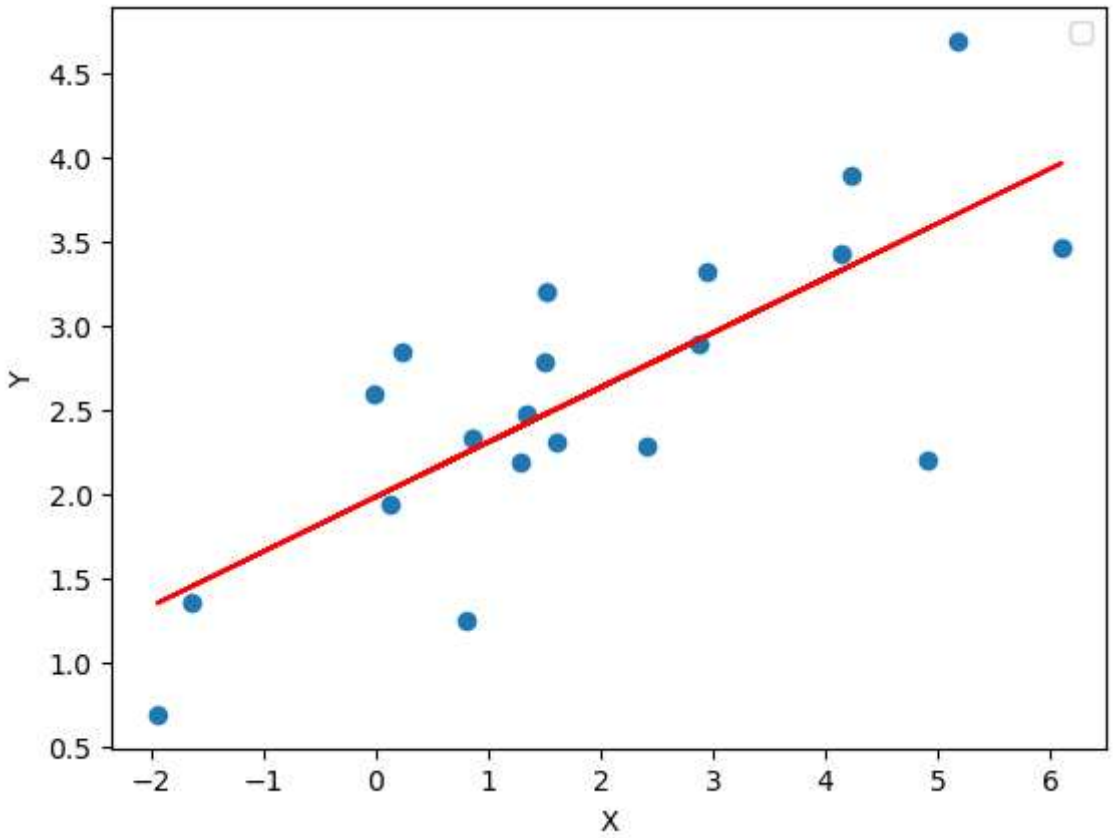
In [11]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from scipy.stats import linregress

#4.1
data = pd.read_csv('linreg_data.csv')
X = data['X'].values
Y = data['Y'].values

n = len(X)
m = (n * np.sum(X * Y) - np.sum(X) * np.sum(Y)) / (n * np.sum(X**2) - (np.sum(X))**2)
b = (np.sum(Y) - m * np.sum(X)) / n


fitted_line = m * X + b

plt.scatter(X, Y)
plt.plot(X, fitted_line, color='red')
plt.xlabel('X')
plt.ylabel('Y')
plt.legend()
plt.show()

#4.2

slope, intercept, _, _, _ = linregress(X, Y)
fitted_line_scipy = slope * X + intercept

plt.scatter(X, Y)
plt.plot(X, fitted_line_scipy, color='red')
plt.xlabel('X')
plt.ylabel('Y')
plt.legend()
plt.show()

#4.3
missing_value_x = 2
missing_value_y = m * missing_value_x + b
print(f'Y value at X = {missing_value_x} is: {missing_value_y}')

#4.4
```

```
smoothed_observations = m * X + b

plt.scatter(X, Y)
plt.plot(X, smoothed_observations, color='red')
plt.xlabel('X')
plt.ylabel('Y')
plt.legend()
plt.show()
```

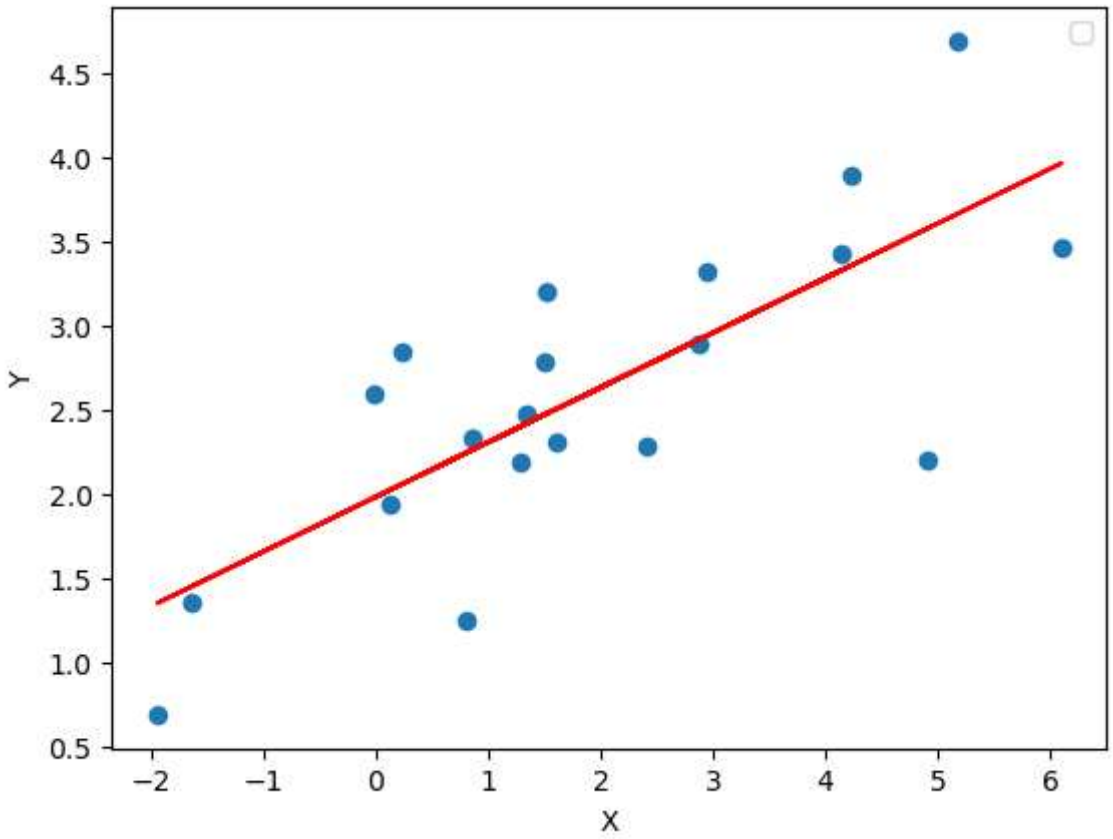
```
No artists with labels found to put in legend.  Note that artists whose label start with an underscore are ignored when legend() is called with no argument.
```




```
No artists with labels found to put in legend.  Note that artists whose label start with an underscore are ignored when legend() is called with no argument.
```




```
No artists with labels found to put in legend.  Note that artists whose label start with an underscore are ignored when legend()
is called with no argument.
Y value at X = 2 is: 2.629747164010065
```



In [ ]:

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