```python
In [1]:  import numpy as np
         import pandas as pd
         import matplotlib.pyplot as plt
         from sklearn.linear_model import LinearRegression
         from sklearn.metrics import r2_score
         from sklearn.linear_model import LinearRegression
```

```python
In [2]:  data = pd.read_csv(r"C:\Users\Admin\Downloads\archive\headbrain1.csv")
         data
```

Out[2]:

	Gender	Age Range	Head Size	Brain Weight
0	1	1	4512	1530
1	1	1	3738	1297
2	1	1	4261	1335
3	1	1	3777	1282
4	1	1	4177	1590
...	...	...	...	...
232	2	2	3214	1110
233	2	2	3394	1215
234	2	2	3233	1104
235	2	2	3352	1170
236	2	2	3391	1120

237 rows × 4 columns

```python
In [3]:  data.isnull().sum()
```

```
Out[3]:  Gender          0
         Age Range       0
         Head Size       0
         Brain Weight    0
         dtype: int64
```

```python
In [4]:  import numpy as np
         import matplotlib.pyplot as plt

         def simple_linear_regression_least_squares(data):
             # Take Head Size as X and Brain Weight as Y
             X = data["Head Size"].values
             Y = data["Brain Weight"].values

             # Calculate means
             X_mean = np.mean(X)
             Y_mean = np.mean(Y)

             # Calculate slope (m) and intercept (c) using least squares method
             numerator = np.sum((X - X_mean) * (Y - Y_mean))
             denominator = np.sum((X - X_mean) ** 2)
             m = numerator / denominator
             c = Y_mean - m * X_mean

             # Predictions
```

```python
    Y_pred = m * X + c

    # R² Score (manual)
    ss_total = np.sum((Y - Y_mean) ** 2)
    ss_residual = np.sum((Y - Y_pred) ** 2)
    r2 = 1 - (ss_residual / ss_total)

    print("Simple Linear Regression (Least Squares Method)")
    print(f"Slope (m): {m}")
    print(f"Intercept (c): {c}")
    print(f"R² Score: {r2}\n")

    # --- Plot ---
    plt.scatter(X, Y, color="blue", label="Actual Data")
    plt.plot(X, Y_pred, color="red", label="Regression Line")
    plt.xlabel("Head Size (cm³)")
    plt.ylabel("Brain Weight (grams)")
    plt.title("Simple Linear Regression (Least Squares Method)")
    plt.legend()
    plt.show()

    return m, c, r2, Y_pred

# ✅ Example call
m, c, r2, preds = simple_linear_regression_least_squares(data)
```

```
Simple Linear Regression (Least Squares Method)
Slope (m): 0.2634293394893993
Intercept (c): 325.5734210494428
R² Score: 0.639311719957
```


Simple Linear Regression (Least Squares Method)