

START

STEP 1: Import required libraries

```
Import pandas
Import matplotlib.pyplot
Import seaborn
```

STEP 2: Load dataset

```
Read CSV file "input.csv" into dataframe df
Display first few rows of dataset
```

STEP 3: Visualize dataset

```
Set seaborn theme to darkgrid
Plot scatter graph:
    X-axis = study_time_hours
    Y-axis = score
Label X-axis and Y-axis
Display plot
```

STEP 4: Define loss function

```
FUNCTION loss_function(m, b, points):
    Set total_error = 0
    FOR each data point in dataset:
        x = study_time_hours
        y = score
        error = y - (m*x + b)
        total_error = total_error + error2
    RETURN total_error / number of points
END FUNCTION
```

STEP 5: Define gradient descent function

```
FUNCTION gradient_descent(m_now, b_now, points, L):
    Set m_gradient = 0
    Set b_gradient = 0
    Set n = number of points

    FOR each data point:
        x = study_time_hours
        y = score

        Calculate m_gradient contribution
        Calculate b_gradient contribution

    Update slope:
        m = m_now - (L × m_gradient)

    Update intercept:
        b = b_now - (L × b_gradient)

    RETURN m, b
```

END FUNCTION

STEP 6: Initialize parameters

Set  $m = 0$

Set  $b = 0$

Set learning rate  $L = 0.01$

Set epochs = 2000

STEP 7: Train model using gradient descent

FOR  $i$  from 0 to epochs:

IF  $i$  is divisible by 50:

Display epoch number

Update  $m$ ,  $b$  using gradient\_descent function

STEP 8: Display final values

Print final slope ( $m$ ) and intercept ( $b$ )

STEP 9: Plot regression line

Plot scatter graph of original data

Plot regression line using equation:

$$y = m \cdot x + b$$

Label axes

Display plot

END