1. What is the relationship that is being analyzed? What are the variables?

* This is a Linear Regression problem, where we study how the minimum January temperature (the output or label) changes over time, using the number of years since 1982 (the input or feature) to find the trend.
* Input **(X):** Years since 1982
* Output **(Y):** Minimum January temperature

1. What is the type of model the code is running?

* A Linear Regression model uses the slope and intercept to draw a straight line that best fits the data.

1. Explain the cost function in the model.

* The cost function, called Sum of Squared Differences (SSD), measures total error by adding up the squared gaps between the model’s predictions and the actual values.
* The cost tells the model how “wrong” it currently is, guiding the optimizer to make better adjustments.

1. What is the role of the optimizer?

* The optimizer helps the model learn. It looks at how wrong the model is (the error), figures out which way to adjust, and then makes small changes to the model’s numbers (like slope and interception) so the mistakes get smaller over time.
* It’s the “engine” that drives learning, gradually improving the line so it fits the data better.

1. In training the model, why does the model change if we keep running the code several times?

* The model changes because learning happens step by step. Each time the code runs, it updates the line a little based on the current error. Over many runs, the line keeps adjusting and slowly gets closer to the best fit.

**Final Model Conclusion:**

The trained model shows a positive slope (≈0.01193327), meaning Seattle’s minimum January temperatures have gradually increased over time, suggesting a slight warming trend in the period studied.