1. Use a neural network to approximate the Runge function

$$f(x) = \frac{1}{1+25x^2}, \quad x \in [-1, 1].$$

Write a short report (1–2 pages) explaining method, results, and discussion including

- Plot the true function and the neural network prediction together.
- Show the training/validation loss curves.
- Compute and report errors (MSE or max error).

data：從 [-1.1] 中 uniformly random 100000 筆資料

其中 training data 60000 筆，validation data 20000 筆

test data 20000 筆

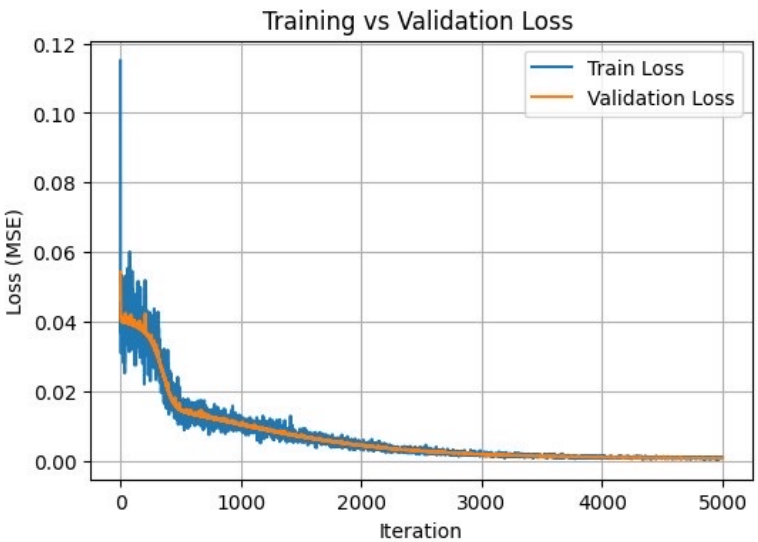
hypothesis：

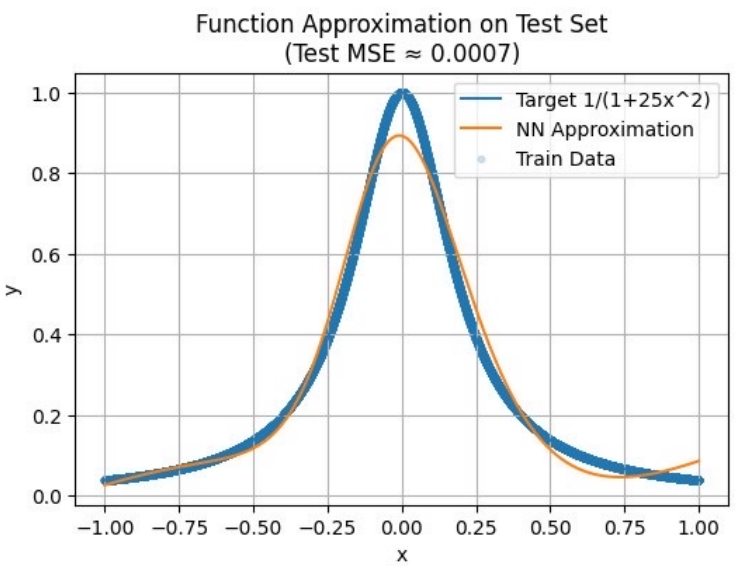
$f_\theta : \mathbb{R}^1 \longrightarrow \mathbb{R}^1$

number of hidden layer：1

numbers of neurons in this hidden layer：20

activation function：$\sigma(x) = \tanh(x)$



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Best Validation Loss: 0.000714
Test Loss (MSE): 0.000719
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code 來源：ChatGPT