

Model Performance Report

Andrew Peng

October 18, 2025

Contents

1	Summary	2
2	Enforced bound of 2 (<code>lconst_mult = 100</code>); Epoch 200	3
3	No bound (<code>lconst_mult = 0</code>); Epoch 200	19
4	Epoch 50 (bounded, 2, 100)	21
5	Epoch 100 (bounded, 2, 100)	23
6	Epoch 150 (bounded, 2, 100)	25
7	Epoch 300 (bounded, 2, 100)	27
8	Epoch 400 (bounded, 2, 100)	29
9	Epoch 500 (bounded, 2, 100)	31
10	Epoch 700 (bounded, 2, 100)	33
11	Epoch 1000 (bounded, 2, 100)	35

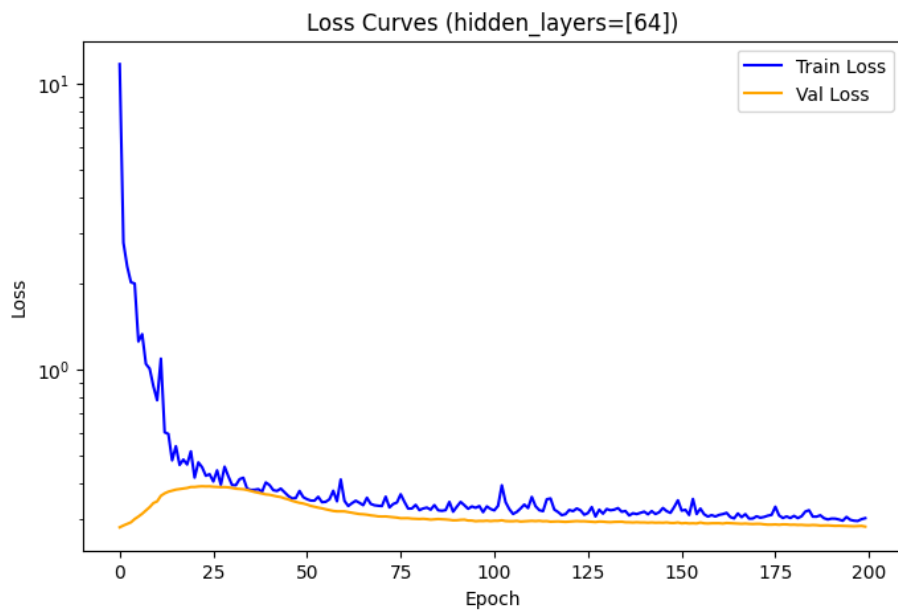
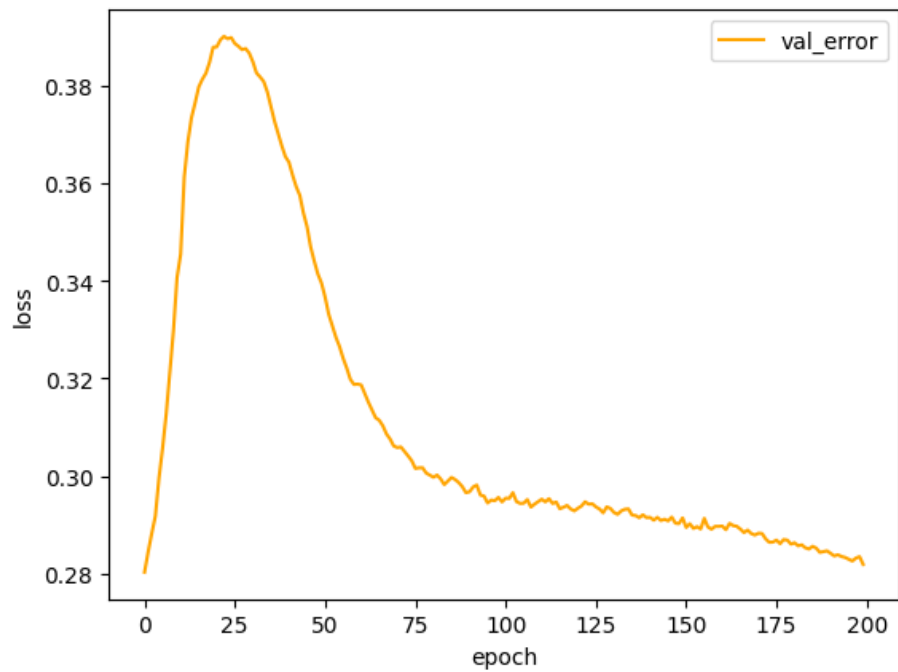
1 Summary

forcing the output to be within range seems to prevent overfitting from occurring at any epoch. if output is unregulated, significant overfitting occurs at 200 epoch. best models are [256]*4 and [32, 64, 128]

2 Enforced bound of 2 (lconst_mult = 100); Epoch 200

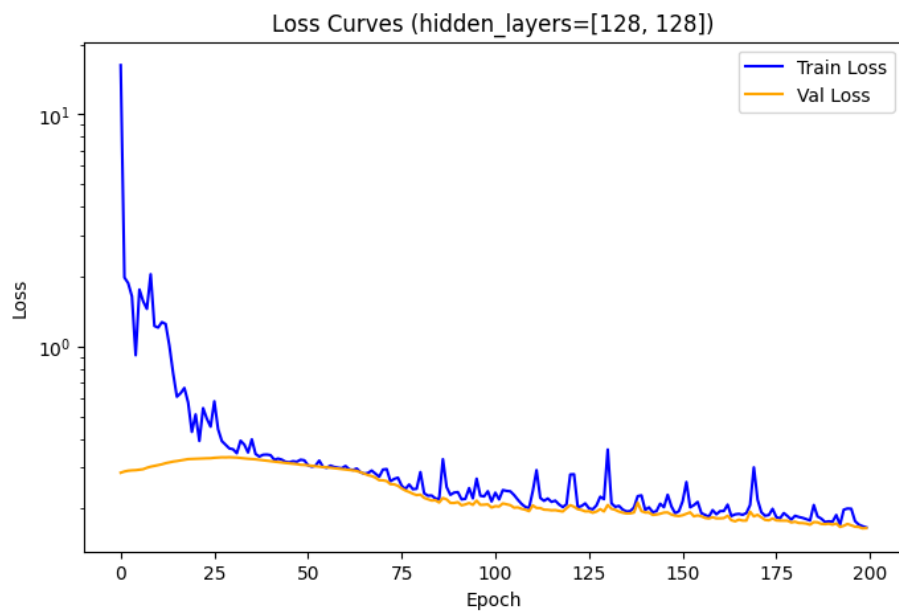
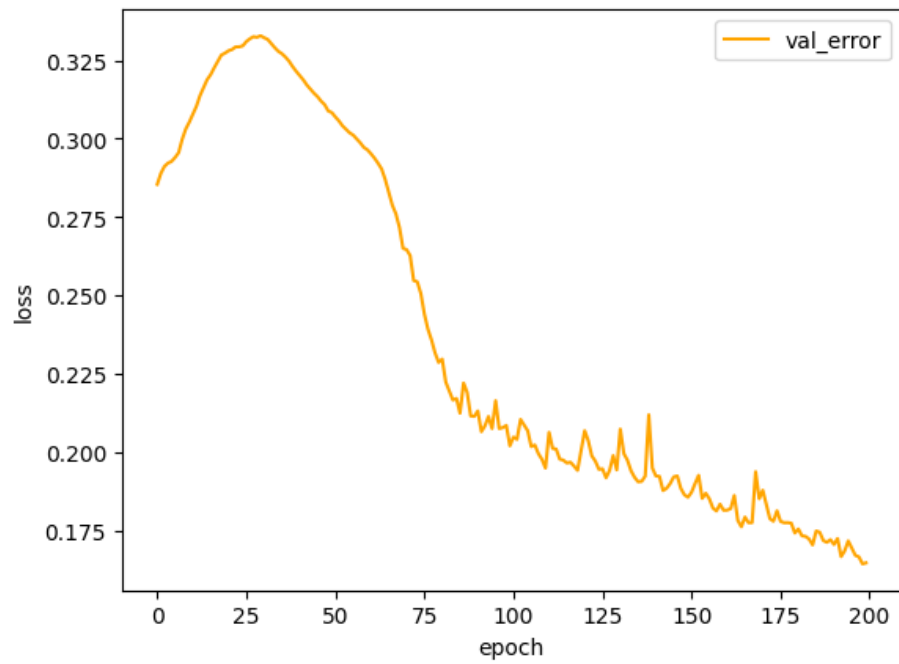
hidden_layers = [64]

- Validation R^2 : -0.3502
- Validation RMSE: 0.3456



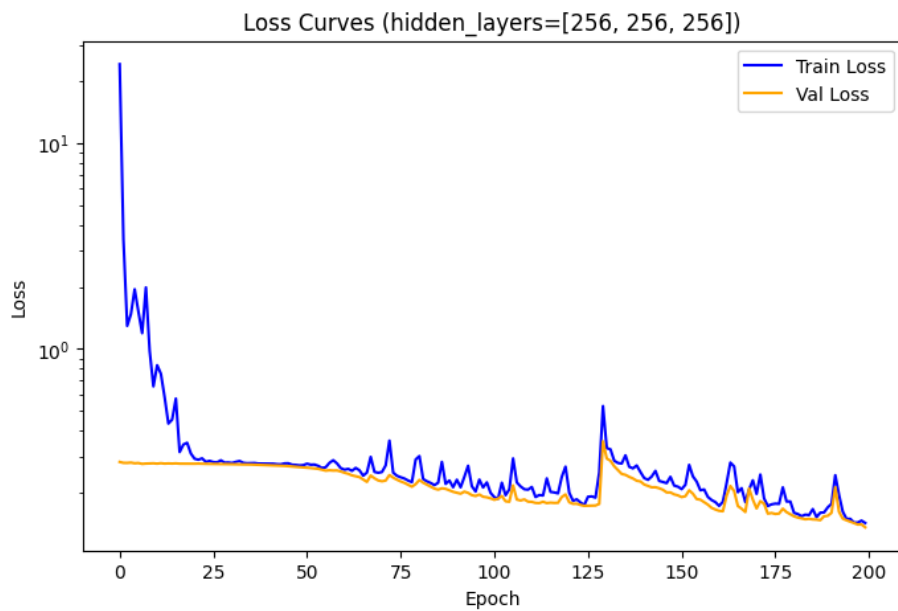
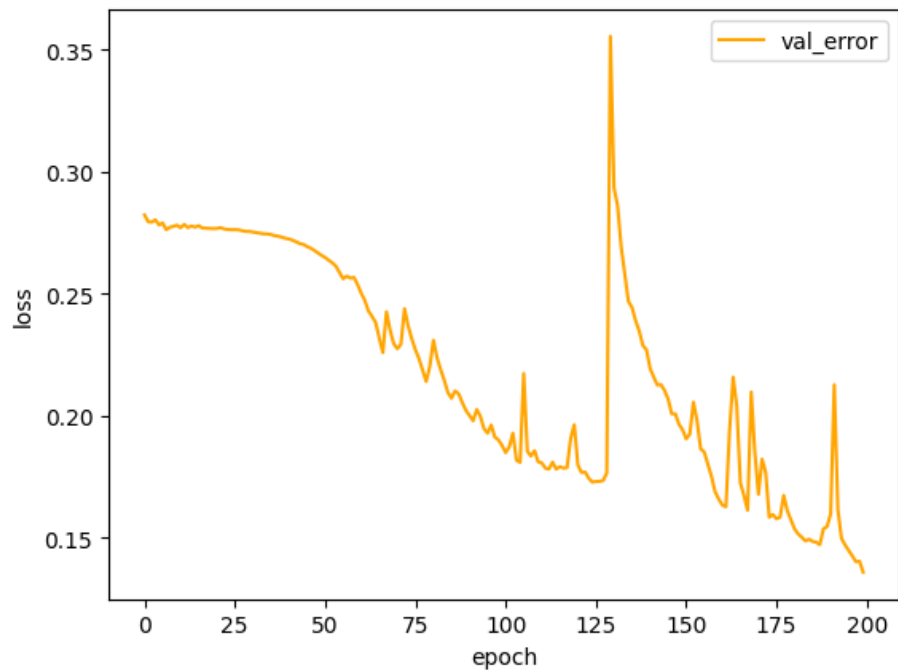
`hidden_layers = [128, 128]`

- Validation R^2 : 0.4786
- Validation RMSE: 0.2083



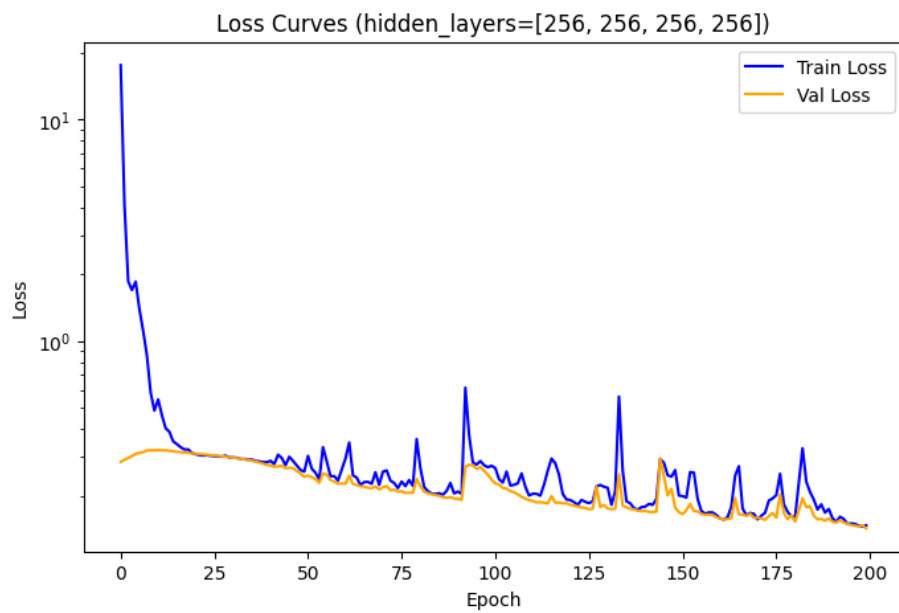
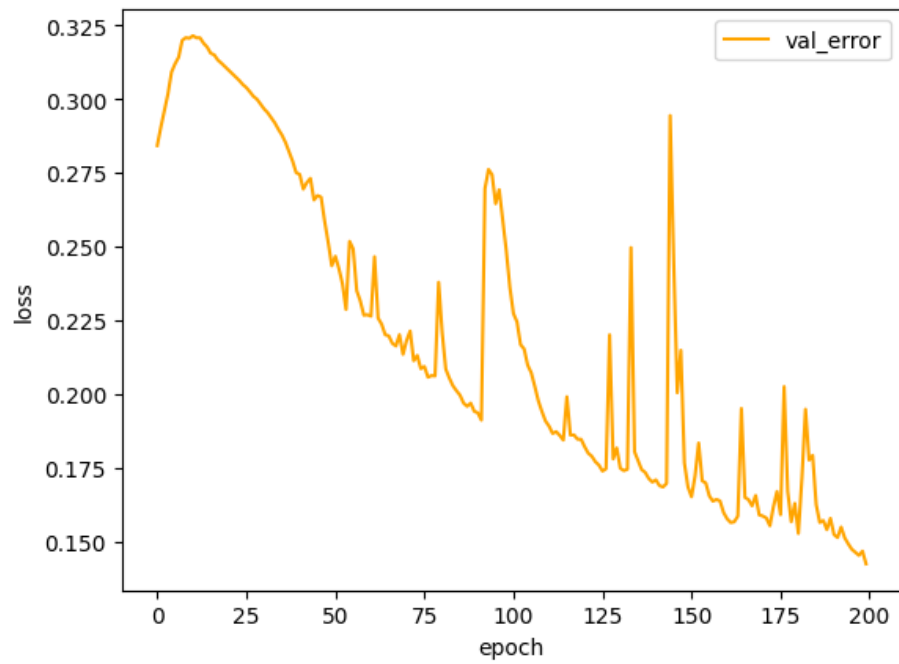
hidden_layers = [256, 256, 256]

- Validation R^2 : 0.5965
- Validation RMSE: 0.1852



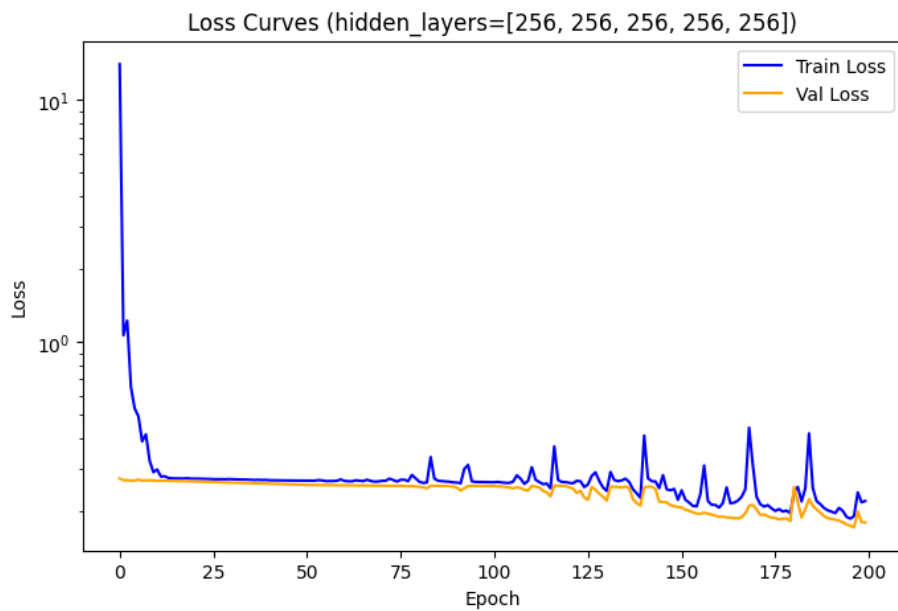
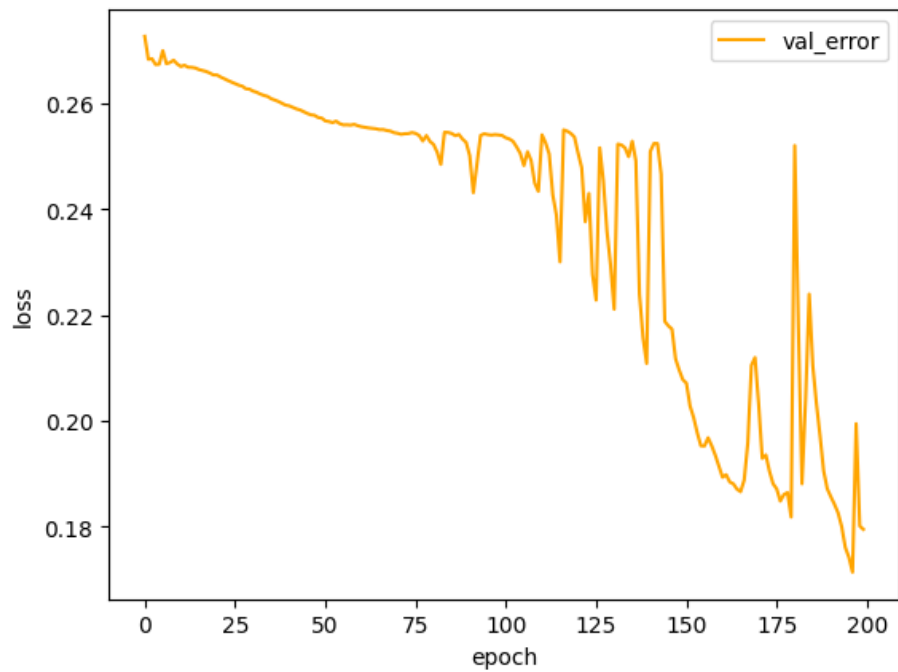
hidden_layers = [256]*4

- Validation R^2 : 0.5307
- Validation RMSE: 0.2004



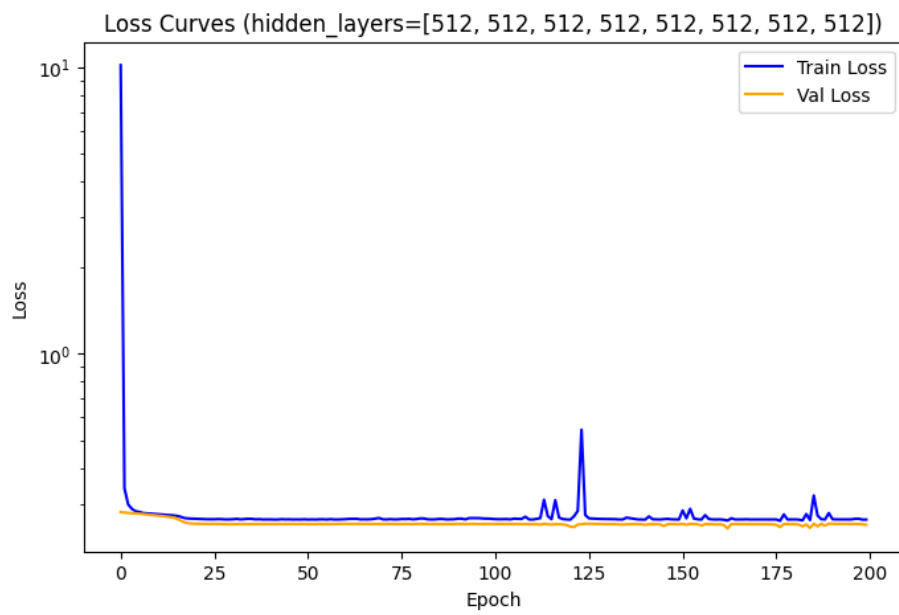
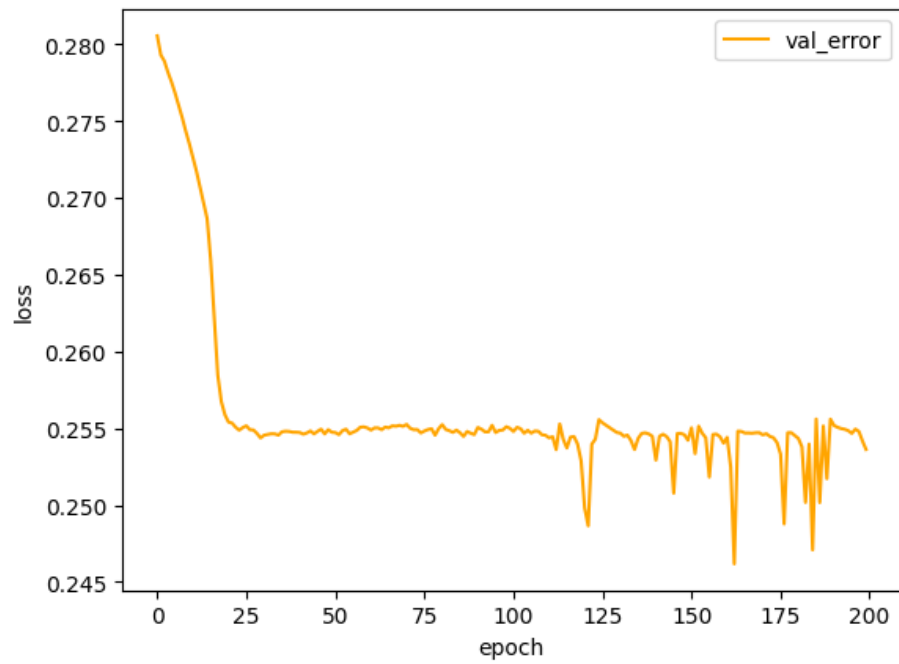
hidden_layers = [256]*5

- Validation R^2 : 0.3263
- Validation RMSE: 0.2386



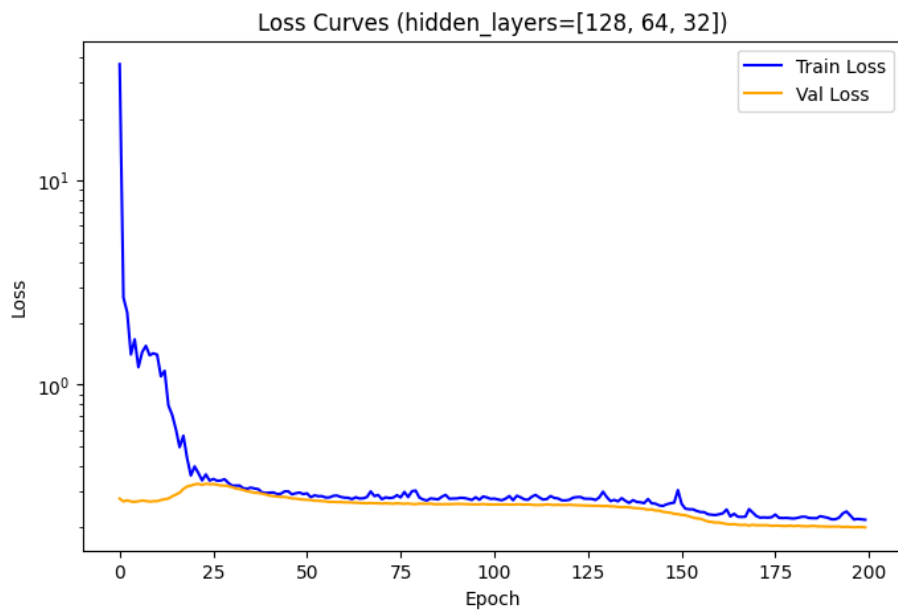
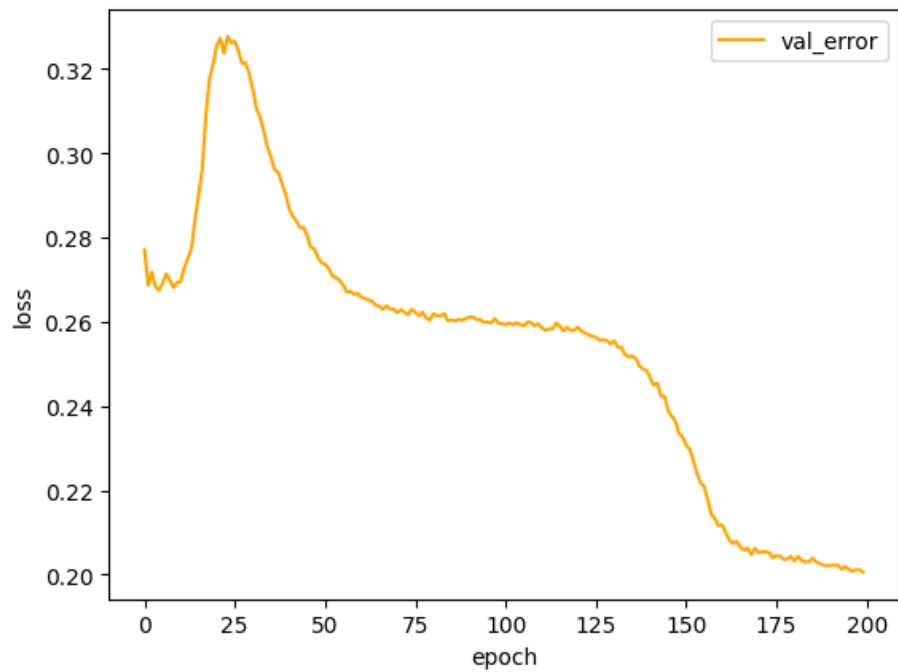
hidden_layers = [512]*8

- Validation R^2 : -0.0845
- Validation RMSE: 0.3132



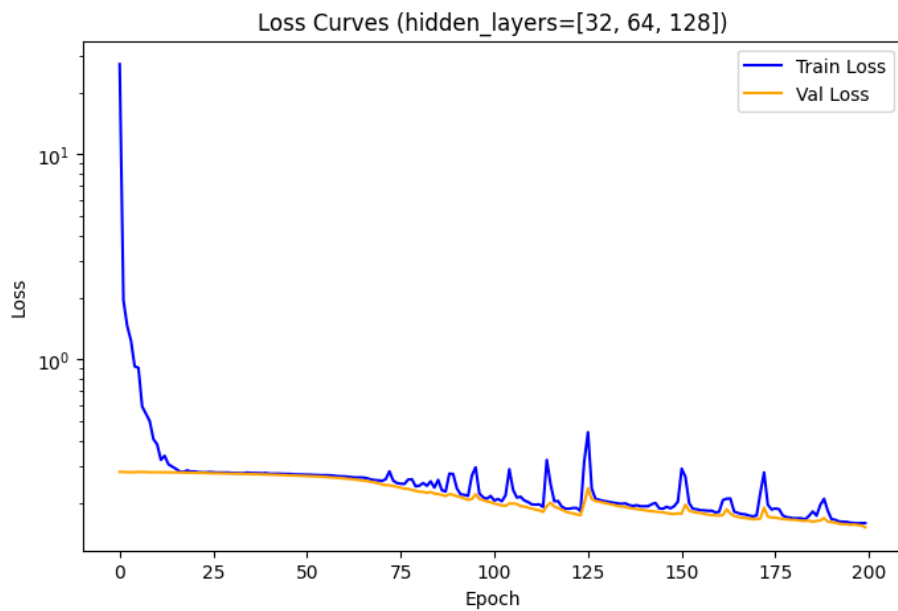
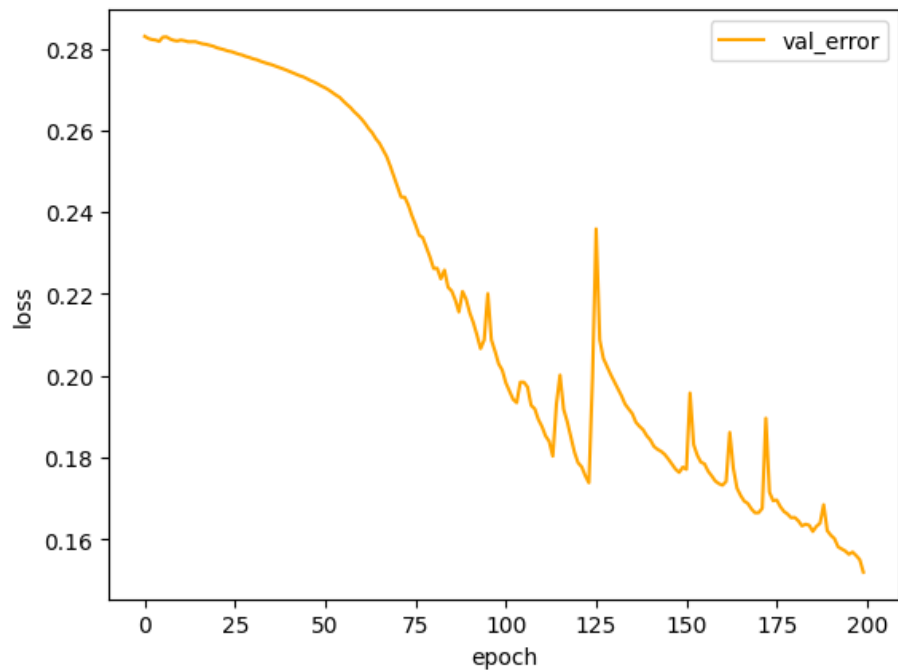
hidden_layers = [128, 64, 32]

- Validation R^2 : -0.0857
- Validation RMSE: 0.2952



hidden_layers = [32, 64, 128]

- Validation R^2 : 0.5169
- Validation RMSE: 0.2014

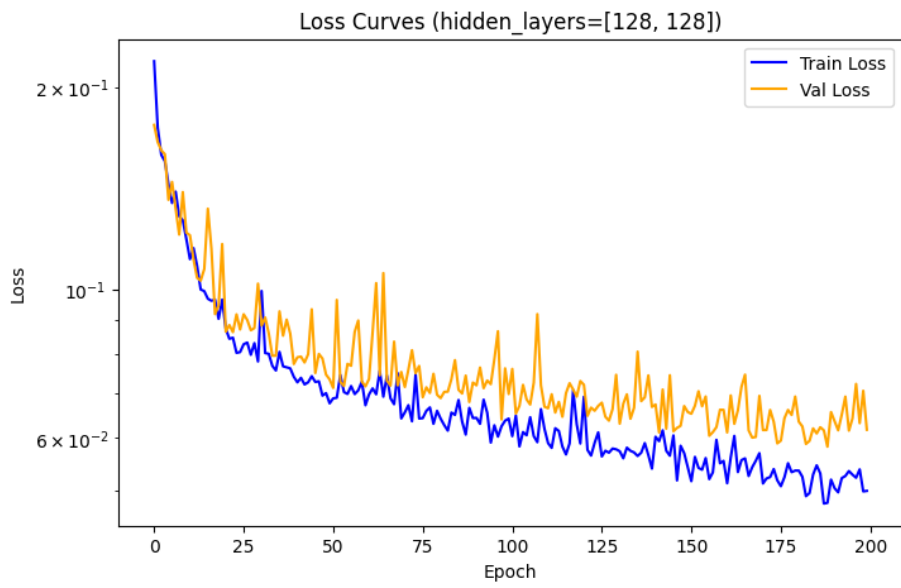
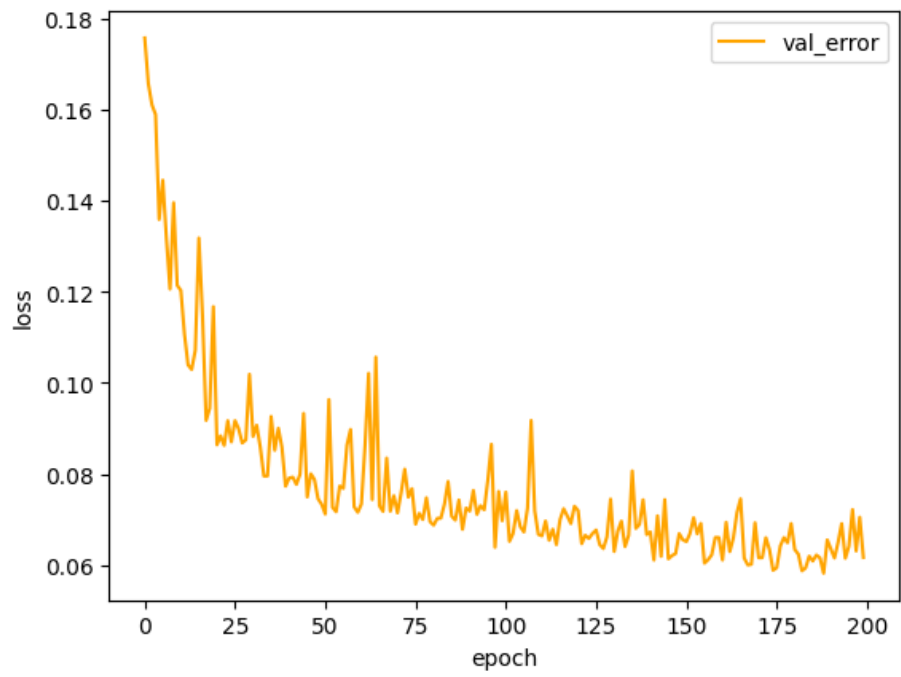


3 No bound (lconst_mult = 0); Epoch 200

hidden_layers = [128, 128]

OVERFITTING!!!

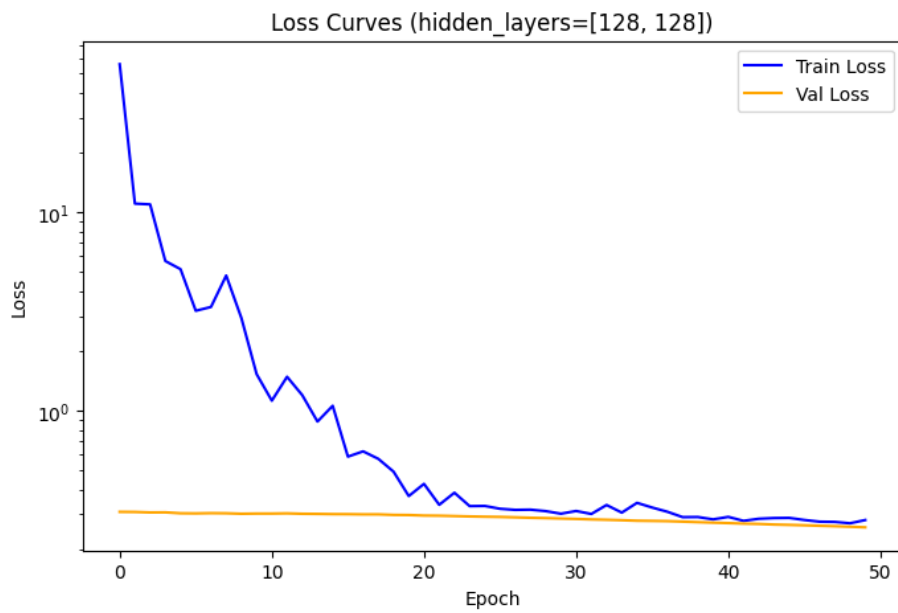
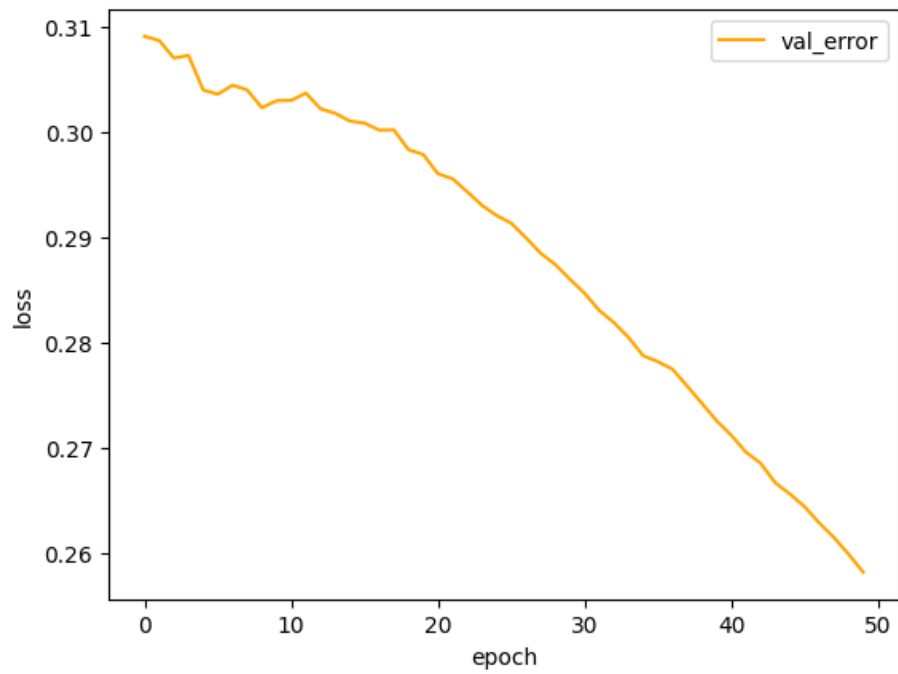
- Validation R^2 : 0.8972
- Validation RMSE: 0.0948
- Final Gap (val - train): 0.0115
- REL Final Gap ((val - train) / train): 22.2216



4 Epoch 50 (bounded, 2, 100)

`hidden_layers = [128, 128]`

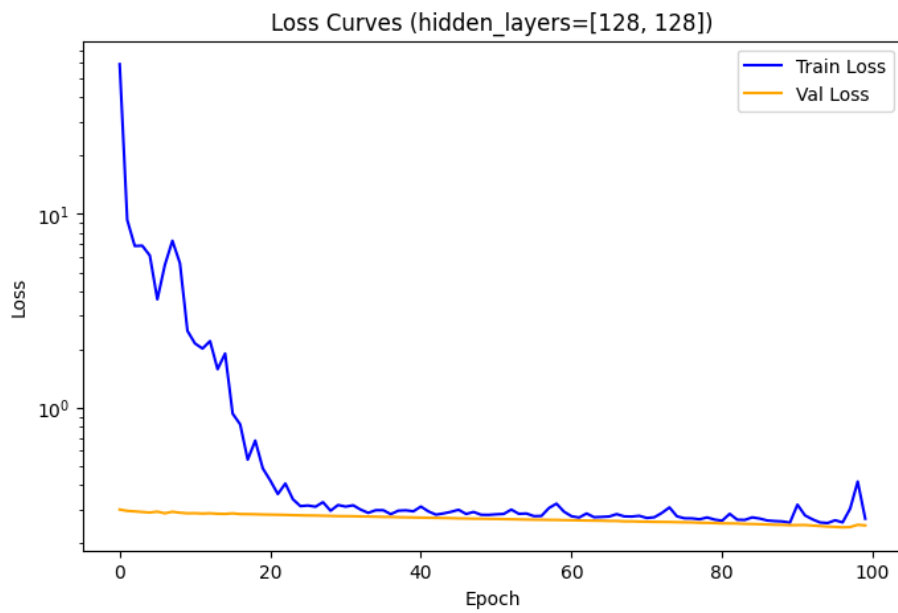
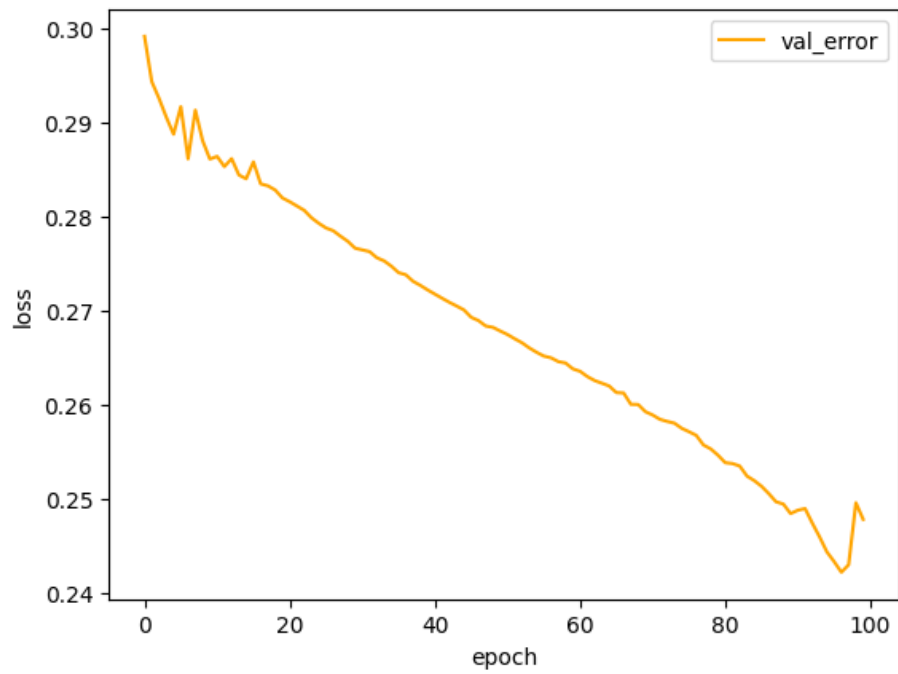
- Validation R^2 : 0.0722
- Validation RMSE: 0.2912



5 Epoch 100 (bounded, 2, 100)

`hidden_layers = [128, 128]`

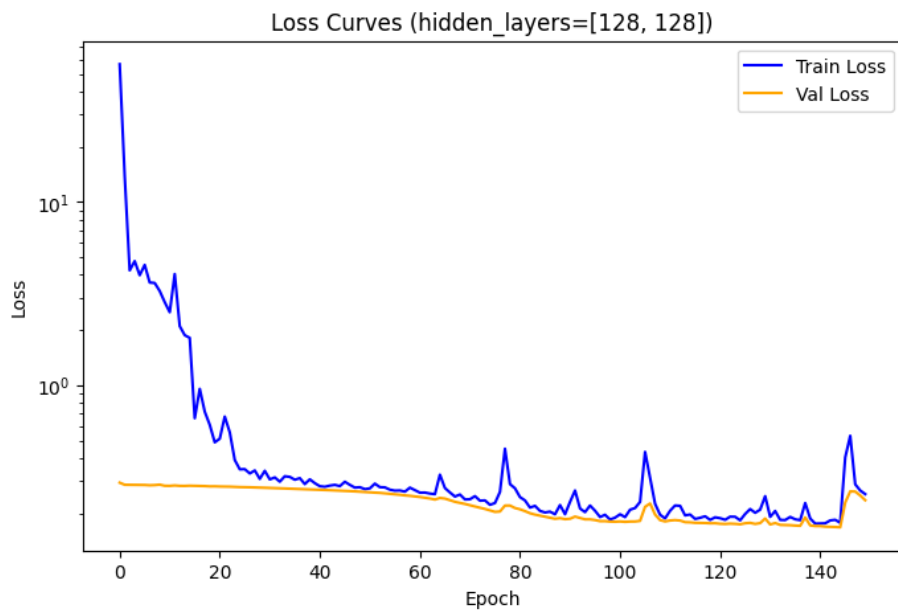
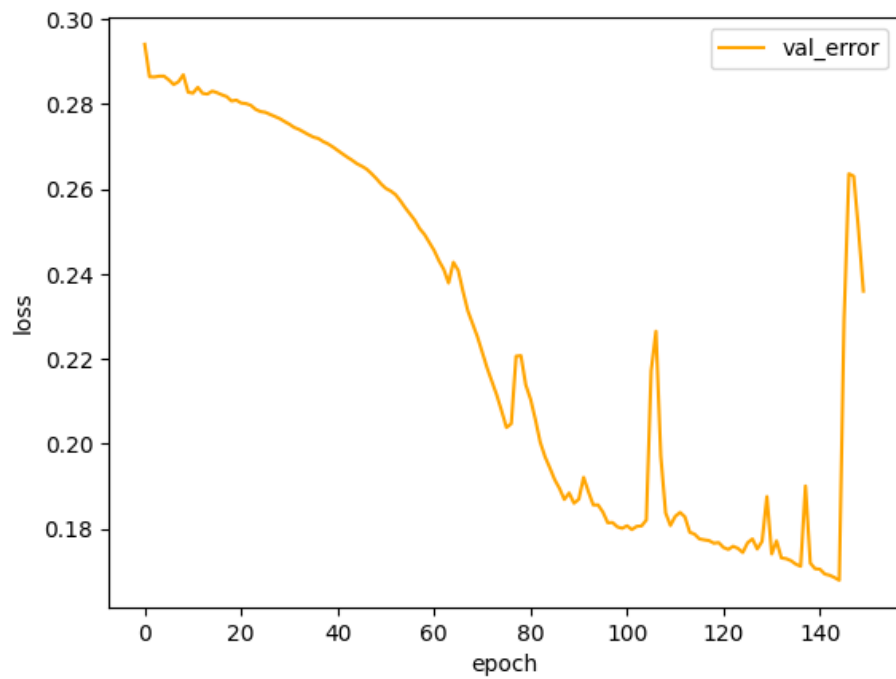
- Validation R^2 : 0.3874
- Validation RMSE: 0.2279



6 Epoch 150 (bounded, 2, 100)

`hidden_layers = [128, 128]`

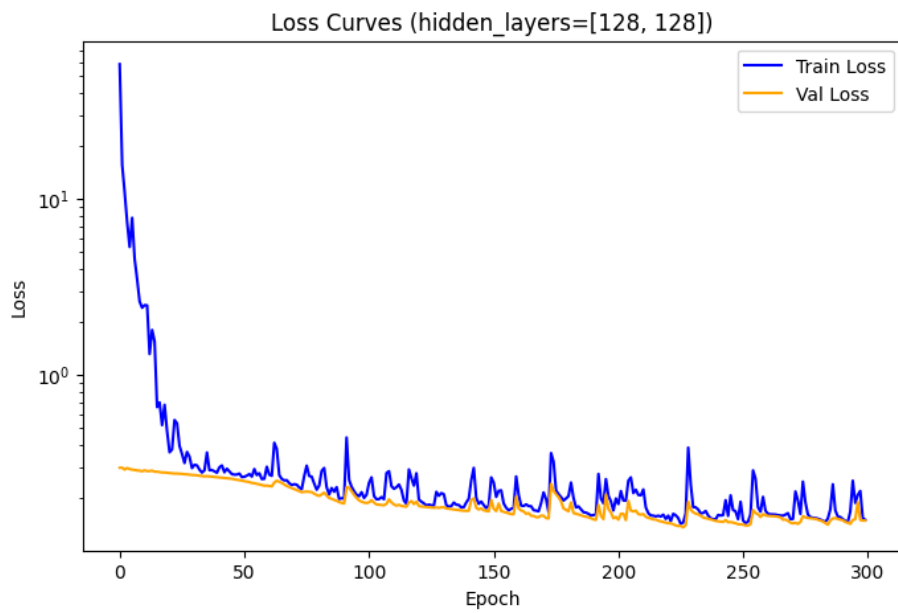
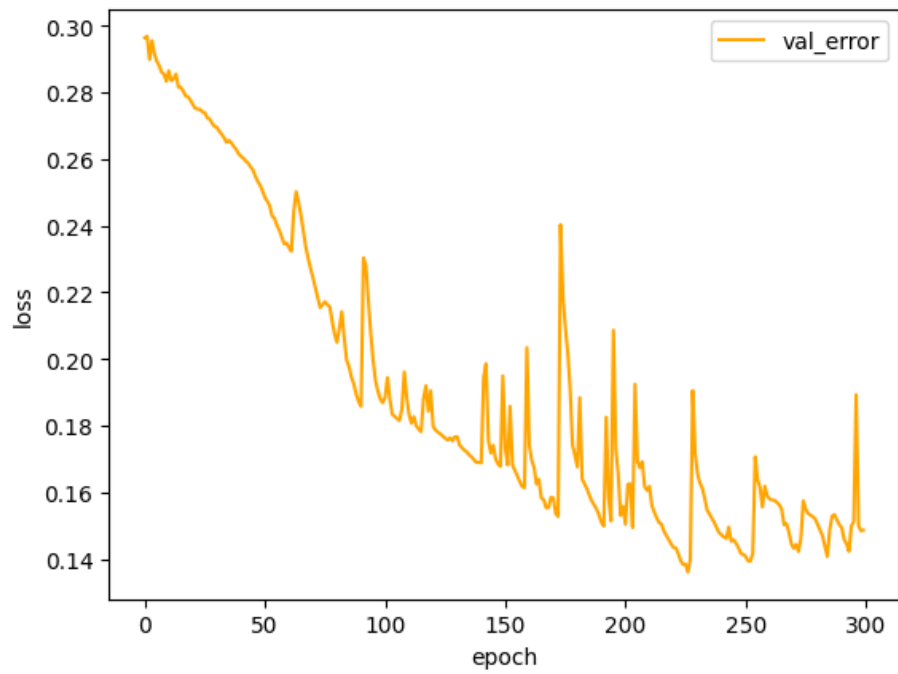
- Validation R^2 : 0.5083
- Validation RMSE: 0.2047



7 Epoch 300 (bounded, 2, 100)

`hidden_layers = [128, 128]`

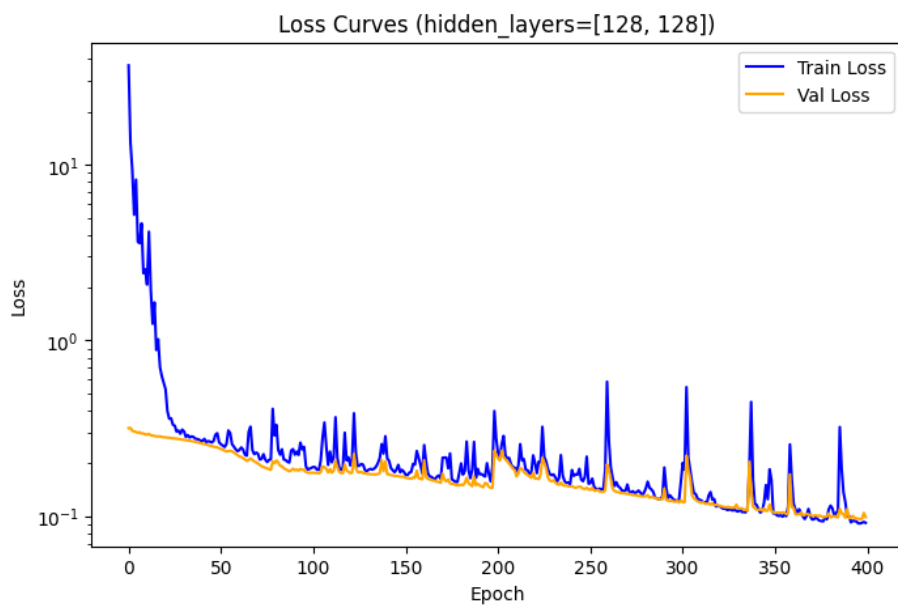
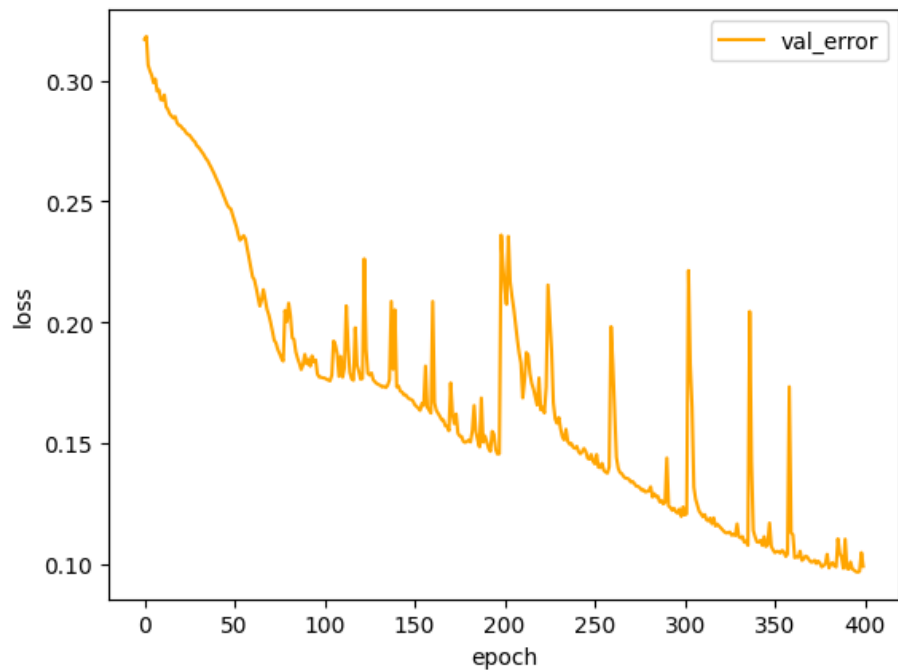
- Validation R^2 : 0.5454
- Validation RMSE: 0.1951



8 Epoch 400 (bounded, 2, 100)

`hidden_layers = [128, 128]`

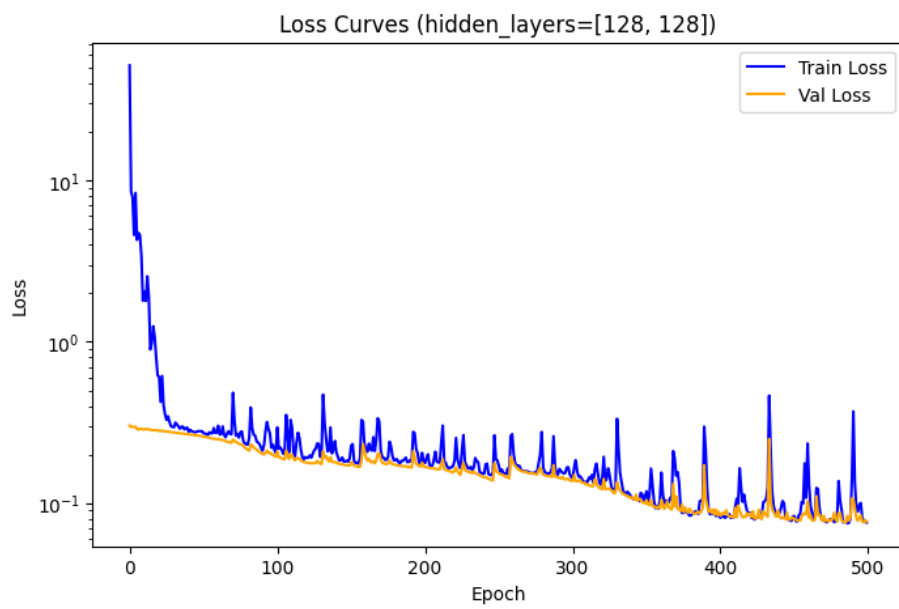
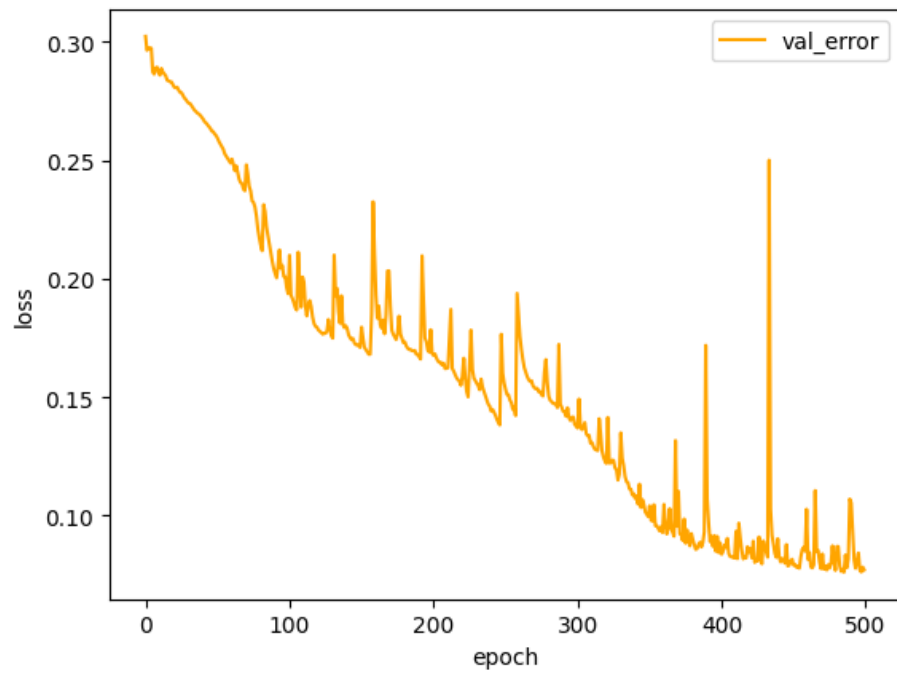
- Validation R^2 : 0.7863
- Validation RMSE: 0.1376



9 Epoch 500 (bounded, 2, 100)

`hidden_layers = [128, 128]`

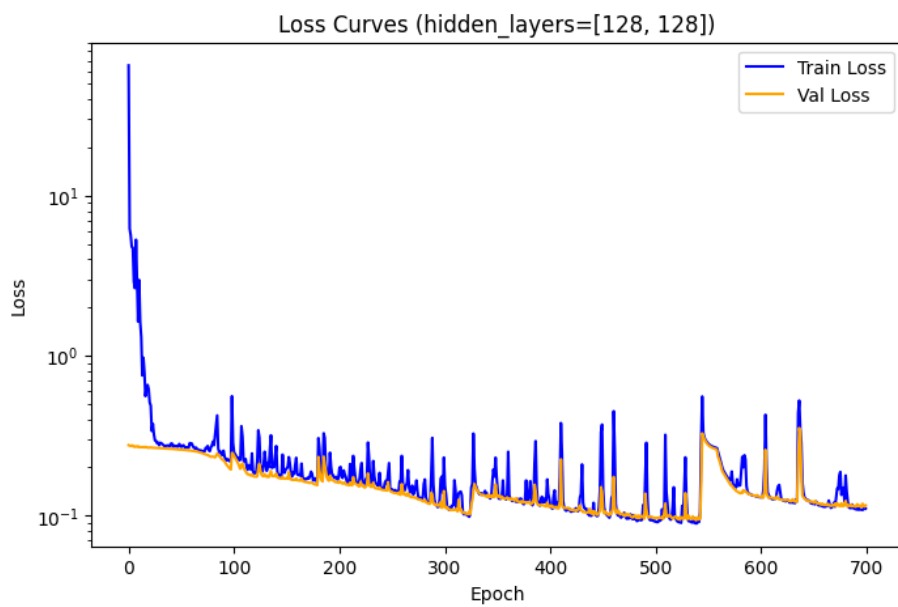
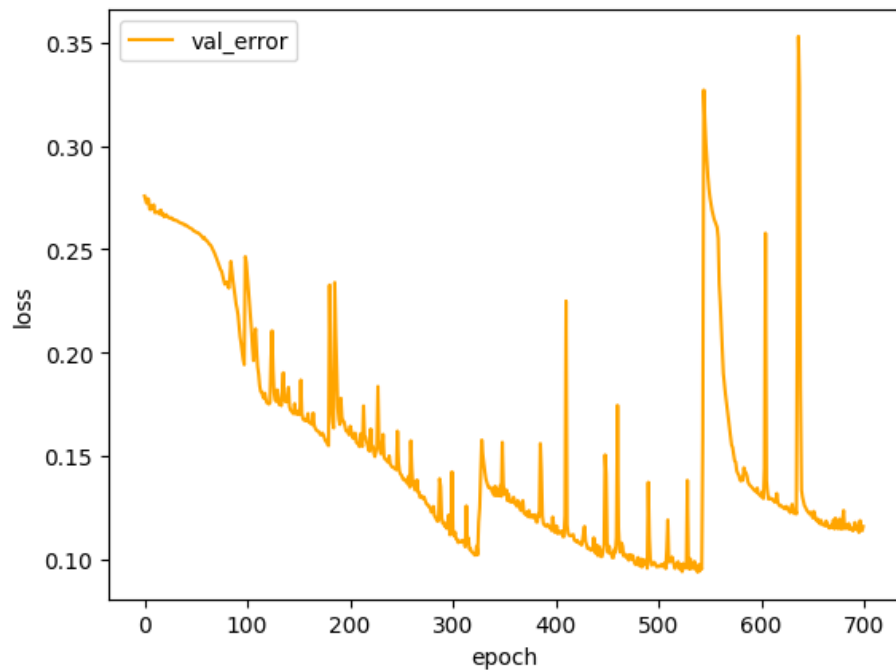
- Validation R^2 : 0.8595
- Validation RMSE: 0.1105
- ABS Final Gap (val - train): 0.0013
- REL Final Gap ((val - train) / train): 1.6534



10 Epoch 700 (bounded, 2, 100)

`hidden_layers = [128, 128]`

- Validation R^2 : 0.6510
- Validation RMSE: 0.1736
- Final Gap (val - train): 0.0052
- REL Final Gap ((val - train) / train): 4.7052



11 Epoch 1000 (bounded, 2, 100)

`hidden_layers = [128, 128]`

- Validation R^2 : 0.8496
- Validation RMSE: 0.1152
- Final Gap (val - train): 0.0035
- REL Final Gap ((val - train) / train): 4.7446

