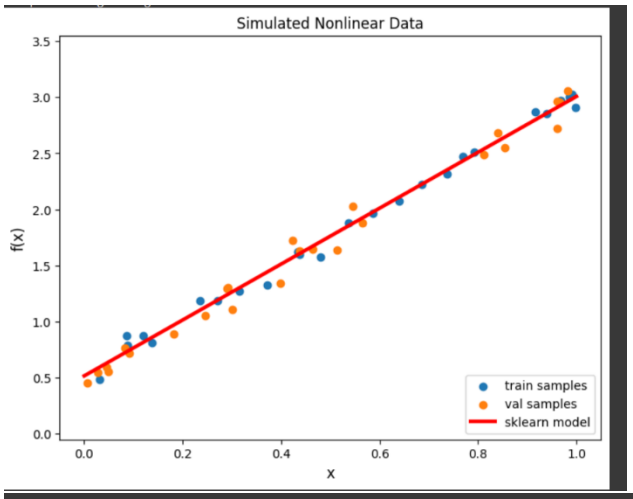
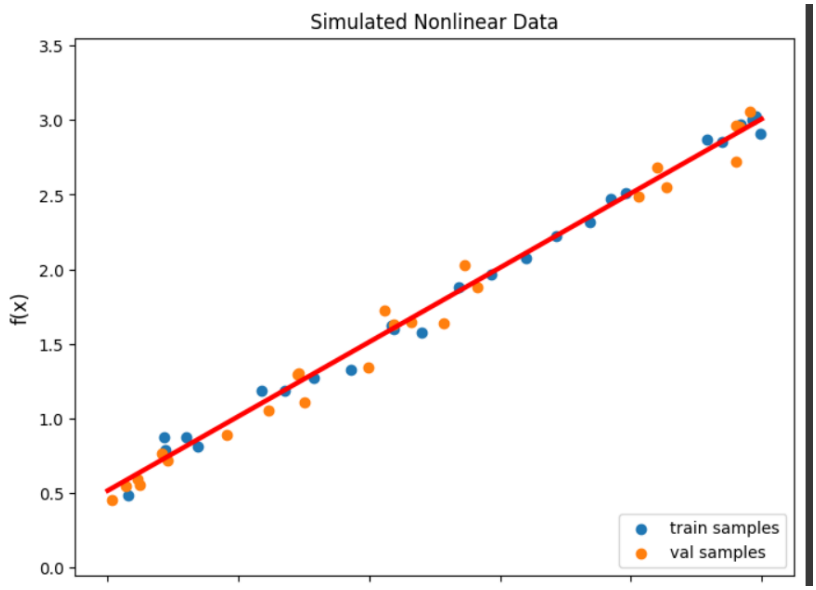
https://colab.research.google.com/drive/1wsOHSRsQWUHONOwLX128Ni9BZ_etTwy0?usp=sharing

1.a)



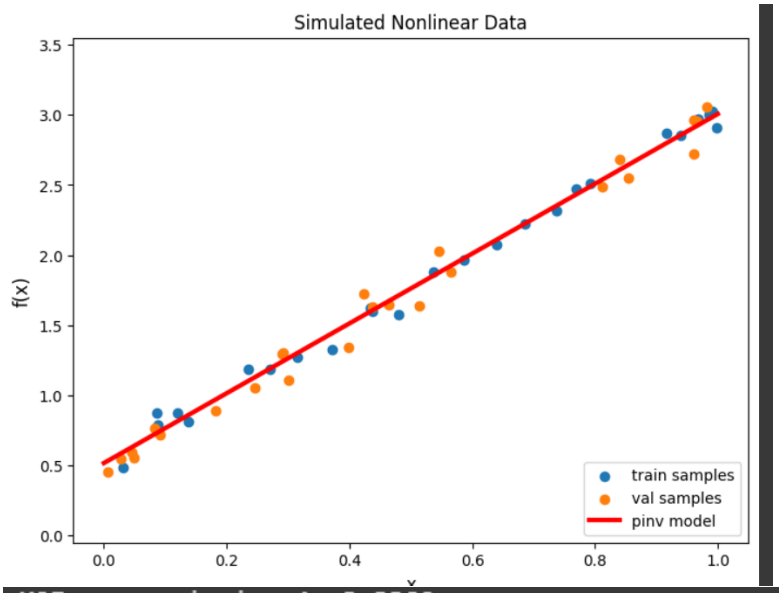

```
MSE of sklearn model:  0.009275569740821422
```

1.b)




```
Shape of X_train_extended: (25, 2)
Shape of X_val_extended: (25, 2)
MSE of manual model:  0.009275569740821414
```

1.c)




```
MSE error at step 1: 3.3382
MSE error at step 100: 0.0915
MSE error at step 200: 0.0294
MSE error at step 300: 0.0148
MSE error at step 400: 0.0110
MSE error at step 500: 0.0099
MSE error at step 600: 0.0095
MSE error at step 700: 0.0094
MSE error at step 800: 0.0093
MSE error at step 900: 0.0093
MSE error at step 1000: 0.0093
Regression Coefficient w :  [[0.51749867]
 [2.4894615 ]]
MSE of the GDE Model on train:  0.00419947558549957
MSE of the GDE Model on val:  0.0092857266765368
```

The gradient solution (part1.c) is very close (MSE=~ 0.00927 for every solution).