loss-error-in-neural-networks

September 22, 2023

```python
[2]: # using neural networks for ML to learn the relationship between X and Y

# importing the libraries
import tensorflow as tf
import numpy as np
from tensorflow import keras

# defining and compiling the neural network
model = tf.keras.Sequential([keras.layers.Dense(units=1, input_shape=[1])])

model.compile(optimizer='sgd', loss='mean_squared_error')


# providing the data
xs = np.array([1.0, 3.0, 6.0, 9.0, 12.0, 15.0], dtype=float)
ys = np.array([-2.0, 0.0, 2.0, 4.0, 6.0, 8.0], dtype=float)

# training the neural network
model.fit(xs, ys, epochs=500)
```

```
Epoch 1/500
1/1 [==============================] - 1s 731ms/step - loss: 5.4299
Epoch 2/500
1/1 [==============================] - 0s 13ms/step - loss: 3.3217
Epoch 3/500
1/1 [==============================] - 0s 18ms/step - loss: 2.3720
Epoch 4/500
1/1 [==============================] - 0s 12ms/step - loss: 1.9388
Epoch 5/500
1/1 [==============================] - 0s 26ms/step - loss: 1.7359
Epoch 6/500
1/1 [==============================] - 0s 23ms/step - loss: 1.6357
Epoch 7/500
1/1 [==============================] - 0s 18ms/step - loss: 1.5815
Epoch 8/500
1/1 [==============================] - 0s 20ms/step - loss: 1.5478
Epoch 9/500
1/1 [==============================] - 0s 18ms/step - loss: 1.5234
```

```
Epoch 10/500
1/1 [==============================] - 0s 15ms/step - loss: 1.5033
Epoch 11/500
1/1 [==============================] - 0s 12ms/step - loss: 1.4851
Epoch 12/500
1/1 [==============================] - 0s 16ms/step - loss: 1.4680
Epoch 13/500
1/1 [==============================] - 0s 20ms/step - loss: 1.4513
Epoch 14/500
1/1 [==============================] - 0s 23ms/step - loss: 1.4351
Epoch 15/500
1/1 [==============================] - 0s 19ms/step - loss: 1.4191
Epoch 16/500
1/1 [==============================] - 0s 18ms/step - loss: 1.4033
Epoch 17/500
1/1 [==============================] - 0s 11ms/step - loss: 1.3877
Epoch 18/500
1/1 [==============================] - 0s 7ms/step - loss: 1.3722
Epoch 19/500
1/1 [==============================] - 0s 10ms/step - loss: 1.3570
Epoch 20/500
1/1 [==============================] - 0s 10ms/step - loss: 1.3419
Epoch 21/500
1/1 [==============================] - 0s 9ms/step - loss: 1.3270
Epoch 22/500
1/1 [==============================] - 0s 9ms/step - loss: 1.3123
Epoch 23/500
1/1 [==============================] - 0s 9ms/step - loss: 1.2978
Epoch 24/500
1/1 [==============================] - 0s 12ms/step - loss: 1.2834
Epoch 25/500
1/1 [==============================] - 0s 17ms/step - loss: 1.2692
Epoch 26/500
1/1 [==============================] - 0s 9ms/step - loss: 1.2551
Epoch 27/500
1/1 [==============================] - 0s 12ms/step - loss: 1.2412
Epoch 28/500
1/1 [==============================] - 0s 12ms/step - loss: 1.2275
Epoch 29/500
1/1 [==============================] - 0s 17ms/step - loss: 1.2139
Epoch 30/500
1/1 [==============================] - 0s 14ms/step - loss: 1.2004
Epoch 31/500
1/1 [==============================] - 0s 10ms/step - loss: 1.1872
Epoch 32/500
1/1 [==============================] - 0s 11ms/step - loss: 1.1740
Epoch 33/500
1/1 [==============================] - 0s 13ms/step - loss: 1.1611
```

```
Epoch 34/500
1/1 [==============================] - 0s 13ms/step - loss: 1.1482
Epoch 35/500
1/1 [==============================] - 0s 14ms/step - loss: 1.1356
Epoch 36/500
1/1 [==============================] - 0s 11ms/step - loss: 1.1230
Epoch 37/500
1/1 [==============================] - 0s 15ms/step - loss: 1.1106
Epoch 38/500
1/1 [==============================] - 0s 16ms/step - loss: 1.0984
Epoch 39/500
1/1 [==============================] - 0s 12ms/step - loss: 1.0863
Epoch 40/500
1/1 [==============================] - 0s 18ms/step - loss: 1.0743
Epoch 41/500
1/1 [==============================] - 0s 20ms/step - loss: 1.0625
Epoch 42/500
1/1 [==============================] - 0s 16ms/step - loss: 1.0508
Epoch 43/500
1/1 [==============================] - 0s 17ms/step - loss: 1.0392
Epoch 44/500
1/1 [==============================] - 0s 32ms/step - loss: 1.0278
Epoch 45/500
1/1 [==============================] - 0s 24ms/step - loss: 1.0165
Epoch 46/500
1/1 [==============================] - 0s 15ms/step - loss: 1.0053
Epoch 47/500
1/1 [==============================] - 0s 21ms/step - loss: 0.9943
Epoch 48/500
1/1 [==============================] - 0s 15ms/step - loss: 0.9833
Epoch 49/500
1/1 [==============================] - 0s 14ms/step - loss: 0.9726
Epoch 50/500
1/1 [==============================] - 0s 10ms/step - loss: 0.9619
Epoch 51/500
1/1 [==============================] - 0s 11ms/step - loss: 0.9513
Epoch 52/500
1/1 [==============================] - 0s 10ms/step - loss: 0.9409
Epoch 53/500
1/1 [==============================] - 0s 12ms/step - loss: 0.9306
Epoch 54/500
1/1 [==============================] - 0s 13ms/step - loss: 0.9204
Epoch 55/500
1/1 [==============================] - 0s 16ms/step - loss: 0.9103
Epoch 56/500
1/1 [==============================] - 0s 11ms/step - loss: 0.9004
Epoch 57/500
1/1 [==============================] - 0s 23ms/step - loss: 0.8905
```

```
Epoch 58/500
1/1 [==============================] - 0s 15ms/step - loss: 0.8808
Epoch 59/500
1/1 [==============================] - 0s 14ms/step - loss: 0.8712
Epoch 60/500
1/1 [==============================] - 0s 12ms/step - loss: 0.8617
Epoch 61/500
1/1 [==============================] - 0s 21ms/step - loss: 0.8523
Epoch 62/500
1/1 [==============================] - 0s 14ms/step - loss: 0.8430
Epoch 63/500
1/1 [==============================] - 0s 13ms/step - loss: 0.8338
Epoch 64/500
1/1 [==============================] - 0s 13ms/step - loss: 0.8247
Epoch 65/500
1/1 [==============================] - 0s 22ms/step - loss: 0.8157
Epoch 66/500
1/1 [==============================] - 0s 12ms/step - loss: 0.8068
Epoch 67/500
1/1 [==============================] - 0s 36ms/step - loss: 0.7980
Epoch 68/500
1/1 [==============================] - 0s 17ms/step - loss: 0.7894
Epoch 69/500
1/1 [==============================] - 0s 23ms/step - loss: 0.7808
Epoch 70/500
1/1 [==============================] - 0s 11ms/step - loss: 0.7723
Epoch 71/500
1/1 [==============================] - 0s 14ms/step - loss: 0.7639
Epoch 72/500
1/1 [==============================] - 0s 14ms/step - loss: 0.7556
Epoch 73/500
1/1 [==============================] - 0s 14ms/step - loss: 0.7475
Epoch 74/500
1/1 [==============================] - 0s 10ms/step - loss: 0.7394
Epoch 75/500
1/1 [==============================] - 0s 12ms/step - loss: 0.7313
Epoch 76/500
1/1 [==============================] - 0s 12ms/step - loss: 0.7234
Epoch 77/500
1/1 [==============================] - 0s 31ms/step - loss: 0.7156
Epoch 78/500
1/1 [==============================] - 0s 14ms/step - loss: 0.7079
Epoch 79/500
1/1 [==============================] - 0s 10ms/step - loss: 0.7002
Epoch 80/500
1/1 [==============================] - 0s 17ms/step - loss: 0.6927
Epoch 81/500
1/1 [==============================] - 0s 7ms/step - loss: 0.6852
```

```
Epoch 82/500
1/1 [==============================] - 0s 12ms/step - loss: 0.6778
Epoch 83/500
1/1 [==============================] - 0s 16ms/step - loss: 0.6705
Epoch 84/500
1/1 [==============================] - 0s 9ms/step - loss: 0.6633
Epoch 85/500
1/1 [==============================] - 0s 18ms/step - loss: 0.6562
Epoch 86/500
1/1 [==============================] - 0s 14ms/step - loss: 0.6491
Epoch 87/500
1/1 [==============================] - 0s 9ms/step - loss: 0.6421
Epoch 88/500
1/1 [==============================] - 0s 9ms/step - loss: 0.6352
Epoch 89/500
1/1 [==============================] - 0s 9ms/step - loss: 0.6284
Epoch 90/500
1/1 [==============================] - 0s 8ms/step - loss: 0.6217
Epoch 91/500
1/1 [==============================] - 0s 16ms/step - loss: 0.6150
Epoch 92/500
1/1 [==============================] - 0s 12ms/step - loss: 0.6084
Epoch 93/500
1/1 [==============================] - 0s 15ms/step - loss: 0.6019
Epoch 94/500
1/1 [==============================] - 0s 13ms/step - loss: 0.5955
Epoch 95/500
1/1 [==============================] - 0s 14ms/step - loss: 0.5891
Epoch 96/500
1/1 [==============================] - 0s 12ms/step - loss: 0.5828
Epoch 97/500
1/1 [==============================] - 0s 10ms/step - loss: 0.5766
Epoch 98/500
1/1 [==============================] - 0s 18ms/step - loss: 0.5705
Epoch 99/500
1/1 [==============================] - 0s 26ms/step - loss: 0.5644
Epoch 100/500
1/1 [==============================] - 0s 14ms/step - loss: 0.5584
Epoch 101/500
1/1 [==============================] - 0s 16ms/step - loss: 0.5524
Epoch 102/500
1/1 [==============================] - 0s 22ms/step - loss: 0.5466
Epoch 103/500
1/1 [==============================] - 0s 17ms/step - loss: 0.5408
Epoch 104/500
1/1 [==============================] - 0s 21ms/step - loss: 0.5350
Epoch 105/500
1/1 [==============================] - 0s 13ms/step - loss: 0.5294
```

```
Epoch 106/500
1/1 [==============================] - 0s 16ms/step - loss: 0.5238
Epoch 107/500
1/1 [==============================] - 0s 8ms/step - loss: 0.5182
Epoch 108/500
1/1 [==============================] - 0s 21ms/step - loss: 0.5127
Epoch 109/500
1/1 [==============================] - 0s 9ms/step - loss: 0.5073
Epoch 110/500
1/1 [==============================] - 0s 8ms/step - loss: 0.5020
Epoch 111/500
1/1 [==============================] - 0s 8ms/step - loss: 0.4967
Epoch 112/500
1/1 [==============================] - 0s 10ms/step - loss: 0.4914
Epoch 113/500
1/1 [==============================] - 0s 16ms/step - loss: 0.4863
Epoch 114/500
1/1 [==============================] - 0s 13ms/step - loss: 0.4812
Epoch 115/500
1/1 [==============================] - 0s 10ms/step - loss: 0.4761
Epoch 116/500
1/1 [==============================] - 0s 18ms/step - loss: 0.4711
Epoch 117/500
1/1 [==============================] - 0s 19ms/step - loss: 0.4662
Epoch 118/500
1/1 [==============================] - 0s 10ms/step - loss: 0.4613
Epoch 119/500
1/1 [==============================] - 0s 14ms/step - loss: 0.4564
Epoch 120/500
1/1 [==============================] - 0s 20ms/step - loss: 0.4517
Epoch 121/500
1/1 [==============================] - 0s 9ms/step - loss: 0.4470
Epoch 122/500
1/1 [==============================] - 0s 10ms/step - loss: 0.4423
Epoch 123/500
1/1 [==============================] - 0s 9ms/step - loss: 0.4377
Epoch 124/500
1/1 [==============================] - 0s 15ms/step - loss: 0.4331
Epoch 125/500
1/1 [==============================] - 0s 7ms/step - loss: 0.4286
Epoch 126/500
1/1 [==============================] - 0s 20ms/step - loss: 0.4242
Epoch 127/500
1/1 [==============================] - 0s 12ms/step - loss: 0.4198
Epoch 128/500
1/1 [==============================] - 0s 10ms/step - loss: 0.4154
Epoch 129/500
1/1 [==============================] - 0s 28ms/step - loss: 0.4111
```

```
Epoch 130/500
1/1 [==============================] - 0s 6ms/step - loss: 0.4068
Epoch 131/500
1/1 [==============================] - 0s 14ms/step - loss: 0.4026
Epoch 132/500
1/1 [==============================] - 0s 11ms/step - loss: 0.3985
Epoch 133/500
1/1 [==============================] - 0s 17ms/step - loss: 0.3944
Epoch 134/500
1/1 [==============================] - 0s 6ms/step - loss: 0.3903
Epoch 135/500
1/1 [==============================] - 0s 20ms/step - loss: 0.3863
Epoch 136/500
1/1 [==============================] - 0s 11ms/step - loss: 0.3823
Epoch 137/500
1/1 [==============================] - 0s 15ms/step - loss: 0.3784
Epoch 138/500
1/1 [==============================] - 0s 6ms/step - loss: 0.3745
Epoch 139/500
1/1 [==============================] - 0s 6ms/step - loss: 0.3707
Epoch 140/500
1/1 [==============================] - 0s 8ms/step - loss: 0.3669
Epoch 141/500
1/1 [==============================] - 0s 15ms/step - loss: 0.3631
Epoch 142/500
1/1 [==============================] - 0s 12ms/step - loss: 0.3594
Epoch 143/500
1/1 [==============================] - 0s 33ms/step - loss: 0.3558
Epoch 144/500
1/1 [==============================] - 0s 14ms/step - loss: 0.3521
Epoch 145/500
1/1 [==============================] - 0s 9ms/step - loss: 0.3486
Epoch 146/500
1/1 [==============================] - 0s 17ms/step - loss: 0.3450
Epoch 147/500
1/1 [==============================] - 0s 11ms/step - loss: 0.3415
Epoch 148/500
1/1 [==============================] - 0s 17ms/step - loss: 0.3381
Epoch 149/500
1/1 [==============================] - 0s 14ms/step - loss: 0.3346
Epoch 150/500
1/1 [==============================] - 0s 15ms/step - loss: 0.3313
Epoch 151/500
1/1 [==============================] - 0s 19ms/step - loss: 0.3279
Epoch 152/500
1/1 [==============================] - 0s 9ms/step - loss: 0.3246
Epoch 153/500
1/1 [==============================] - 0s 12ms/step - loss: 0.3213
```

```
Epoch 154/500
1/1 [==============================] - 0s 19ms/step - loss: 0.3181
Epoch 155/500
1/1 [==============================] - 0s 12ms/step - loss: 0.3149
Epoch 156/500
1/1 [==============================] - 0s 12ms/step - loss: 0.3118
Epoch 157/500
1/1 [==============================] - 0s 21ms/step - loss: 0.3086
Epoch 158/500
1/1 [==============================] - 0s 10ms/step - loss: 0.3056
Epoch 159/500
1/1 [==============================] - 0s 10ms/step - loss: 0.3025
Epoch 160/500
1/1 [==============================] - 0s 10ms/step - loss: 0.2995
Epoch 161/500
1/1 [==============================] - 0s 18ms/step - loss: 0.2965
Epoch 162/500
1/1 [==============================] - 0s 11ms/step - loss: 0.2936
Epoch 163/500
1/1 [==============================] - 0s 14ms/step - loss: 0.2907
Epoch 164/500
1/1 [==============================] - 0s 15ms/step - loss: 0.2878
Epoch 165/500
1/1 [==============================] - 0s 10ms/step - loss: 0.2849
Epoch 166/500
1/1 [==============================] - 0s 14ms/step - loss: 0.2821
Epoch 167/500
1/1 [==============================] - 0s 26ms/step - loss: 0.2793
Epoch 168/500
1/1 [==============================] - 0s 24ms/step - loss: 0.2766
Epoch 169/500
1/1 [==============================] - 0s 34ms/step - loss: 0.2739
Epoch 170/500
1/1 [==============================] - 0s 11ms/step - loss: 0.2712
Epoch 171/500
1/1 [==============================] - 0s 72ms/step - loss: 0.2685
Epoch 172/500
1/1 [==============================] - 0s 35ms/step - loss: 0.2659
Epoch 173/500
1/1 [==============================] - 0s 18ms/step - loss: 0.2633
Epoch 174/500
1/1 [==============================] - 0s 35ms/step - loss: 0.2607
Epoch 175/500
1/1 [==============================] - 0s 21ms/step - loss: 0.2582
Epoch 176/500
1/1 [==============================] - 0s 14ms/step - loss: 0.2557
Epoch 177/500
1/1 [==============================] - 0s 49ms/step - loss: 0.2532
```

```
Epoch 178/500
1/1 [==============================] - 0s 43ms/step - loss: 0.2508
Epoch 179/500
1/1 [==============================] - 0s 11ms/step - loss: 0.2483
Epoch 180/500
1/1 [==============================] - 0s 12ms/step - loss: 0.2460
Epoch 181/500
1/1 [==============================] - 0s 21ms/step - loss: 0.2436
Epoch 182/500
1/1 [==============================] - 0s 14ms/step - loss: 0.2412
Epoch 183/500
1/1 [==============================] - 0s 18ms/step - loss: 0.2389
Epoch 184/500
1/1 [==============================] - 0s 10ms/step - loss: 0.2366
Epoch 185/500
1/1 [==============================] - 0s 11ms/step - loss: 0.2344
Epoch 186/500
1/1 [==============================] - 0s 21ms/step - loss: 0.2321
Epoch 187/500
1/1 [==============================] - 0s 8ms/step - loss: 0.2299
Epoch 188/500
1/1 [==============================] - 0s 12ms/step - loss: 0.2278
Epoch 189/500
1/1 [==============================] - 0s 19ms/step - loss: 0.2256
Epoch 190/500
1/1 [==============================] - 0s 15ms/step - loss: 0.2235
Epoch 191/500
1/1 [==============================] - 0s 8ms/step - loss: 0.2213
Epoch 192/500
1/1 [==============================] - 0s 17ms/step - loss: 0.2193
Epoch 193/500
1/1 [==============================] - 0s 12ms/step - loss: 0.2172
Epoch 194/500
1/1 [==============================] - 0s 47ms/step - loss: 0.2152
Epoch 195/500
1/1 [==============================] - 0s 9ms/step - loss: 0.2131
Epoch 196/500
1/1 [==============================] - 0s 10ms/step - loss: 0.2111
Epoch 197/500
1/1 [==============================] - 0s 9ms/step - loss: 0.2092
Epoch 198/500
1/1 [==============================] - 0s 13ms/step - loss: 0.2072
Epoch 199/500
1/1 [==============================] - 0s 19ms/step - loss: 0.2053
Epoch 200/500
1/1 [==============================] - 0s 9ms/step - loss: 0.2034
Epoch 201/500
1/1 [==============================] - 0s 13ms/step - loss: 0.2015
```

```
Epoch 202/500
1/1 [==============================] - 0s 9ms/step - loss: 0.1997
Epoch 203/500
1/1 [==============================] - 0s 24ms/step - loss: 0.1978
Epoch 204/500
1/1 [==============================] - 0s 12ms/step - loss: 0.1960
Epoch 205/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1942
Epoch 206/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1924
Epoch 207/500
1/1 [==============================] - 0s 14ms/step - loss: 0.1907
Epoch 208/500
1/1 [==============================] - 0s 8ms/step - loss: 0.1889
Epoch 209/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1872
Epoch 210/500
1/1 [==============================] - 0s 10ms/step - loss: 0.1855
Epoch 211/500
1/1 [==============================] - 0s 20ms/step - loss: 0.1839
Epoch 212/500
1/1 [==============================] - 0s 17ms/step - loss: 0.1822
Epoch 213/500
1/1 [==============================] - 0s 10ms/step - loss: 0.1806
Epoch 214/500
1/1 [==============================] - 0s 18ms/step - loss: 0.1789
Epoch 215/500
1/1 [==============================] - 0s 9ms/step - loss: 0.1773
Epoch 216/500
1/1 [==============================] - 0s 16ms/step - loss: 0.1757
Epoch 217/500
1/1 [==============================] - 0s 10ms/step - loss: 0.1742
Epoch 218/500
1/1 [==============================] - 0s 12ms/step - loss: 0.1726
Epoch 219/500
1/1 [==============================] - 0s 68ms/step - loss: 0.1711
Epoch 220/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1696
Epoch 221/500
1/1 [==============================] - 0s 23ms/step - loss: 0.1681
Epoch 222/500
1/1 [==============================] - 0s 17ms/step - loss: 0.1666
Epoch 223/500
1/1 [==============================] - 0s 86ms/step - loss: 0.1652
Epoch 224/500
1/1 [==============================] - 0s 39ms/step - loss: 0.1637
Epoch 225/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1623
```

```
Epoch 226/500
1/1 [==============================] - 0s 19ms/step - loss: 0.1609
Epoch 227/500
1/1 [==============================] - 0s 16ms/step - loss: 0.1595
Epoch 228/500
1/1 [==============================] - 0s 10ms/step - loss: 0.1581
Epoch 229/500
1/1 [==============================] - 0s 21ms/step - loss: 0.1567
Epoch 230/500
1/1 [==============================] - 0s 24ms/step - loss: 0.1554
Epoch 231/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1541
Epoch 232/500
1/1 [==============================] - 0s 11ms/step - loss: 0.1527
Epoch 233/500
1/1 [==============================] - 0s 22ms/step - loss: 0.1514
Epoch 234/500
1/1 [==============================] - 0s 14ms/step - loss: 0.1501
Epoch 235/500
1/1 [==============================] - 0s 14ms/step - loss: 0.1489
Epoch 236/500
1/1 [==============================] - 0s 38ms/step - loss: 0.1476
Epoch 237/500
1/1 [==============================] - 0s 17ms/step - loss: 0.1464
Epoch 238/500
1/1 [==============================] - 0s 20ms/step - loss: 0.1451
Epoch 239/500
1/1 [==============================] - 0s 29ms/step - loss: 0.1439
Epoch 240/500
1/1 [==============================] - 0s 23ms/step - loss: 0.1427
Epoch 241/500
1/1 [==============================] - 0s 28ms/step - loss: 0.1415
Epoch 242/500
1/1 [==============================] - 0s 22ms/step - loss: 0.1404
Epoch 243/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1392
Epoch 244/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1381
Epoch 245/500
1/1 [==============================] - 0s 16ms/step - loss: 0.1369
Epoch 246/500
1/1 [==============================] - 0s 9ms/step - loss: 0.1358
Epoch 247/500
1/1 [==============================] - 0s 18ms/step - loss: 0.1347
Epoch 248/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1336
Epoch 249/500
1/1 [==============================] - 0s 11ms/step - loss: 0.1325
```

```
Epoch 250/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1314
Epoch 251/500
1/1 [==============================] - 0s 24ms/step - loss: 0.1304
Epoch 252/500
1/1 [==============================] - 0s 8ms/step - loss: 0.1293
Epoch 253/500
1/1 [==============================] - 0s 18ms/step - loss: 0.1283
Epoch 254/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1273
Epoch 255/500
1/1 [==============================] - 0s 23ms/step - loss: 0.1263
Epoch 256/500
1/1 [==============================] - 0s 19ms/step - loss: 0.1253
Epoch 257/500
1/1 [==============================] - 0s 21ms/step - loss: 0.1243
Epoch 258/500
1/1 [==============================] - 0s 20ms/step - loss: 0.1233
Epoch 259/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1223
Epoch 260/500
1/1 [==============================] - 0s 19ms/step - loss: 0.1214
Epoch 261/500
1/1 [==============================] - 0s 9ms/step - loss: 0.1204
Epoch 262/500
1/1 [==============================] - 0s 24ms/step - loss: 0.1195
Epoch 263/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1186
Epoch 264/500
1/1 [==============================] - 0s 24ms/step - loss: 0.1177
Epoch 265/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1168
Epoch 266/500
1/1 [==============================] - 0s 17ms/step - loss: 0.1159
Epoch 267/500
1/1 [==============================] - 0s 21ms/step - loss: 0.1150
Epoch 268/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1141
Epoch 269/500
1/1 [==============================] - 0s 18ms/step - loss: 0.1133
Epoch 270/500
1/1 [==============================] - 0s 17ms/step - loss: 0.1124
Epoch 271/500
1/1 [==============================] - 0s 12ms/step - loss: 0.1116
Epoch 272/500
1/1 [==============================] - 0s 20ms/step - loss: 0.1107
Epoch 273/500
1/1 [==============================] - 0s 12ms/step - loss: 0.1099
```

```
Epoch 274/500
1/1 [==============================] - 0s 14ms/step - loss: 0.1091
Epoch 275/500
1/1 [==============================] - 0s 19ms/step - loss: 0.1083
Epoch 276/500
1/1 [==============================] - 0s 13ms/step - loss: 0.1075
Epoch 277/500
1/1 [==============================] - 0s 24ms/step - loss: 0.1067
Epoch 278/500
1/1 [==============================] - 0s 26ms/step - loss: 0.1059
Epoch 279/500
1/1 [==============================] - 0s 29ms/step - loss: 0.1052
Epoch 280/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1044
Epoch 281/500
1/1 [==============================] - 0s 19ms/step - loss: 0.1037
Epoch 282/500
1/1 [==============================] - 0s 12ms/step - loss: 0.1029
Epoch 283/500
1/1 [==============================] - 0s 19ms/step - loss: 0.1022
Epoch 284/500
1/1 [==============================] - 0s 10ms/step - loss: 0.1015
Epoch 285/500
1/1 [==============================] - 0s 15ms/step - loss: 0.1007
Epoch 286/500
1/1 [==============================] - 0s 11ms/step - loss: 0.1000
Epoch 287/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0993
Epoch 288/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0986
Epoch 289/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0980
Epoch 290/500
1/1 [==============================] - 0s 18ms/step - loss: 0.0973
Epoch 291/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0966
Epoch 292/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0960
Epoch 293/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0953
Epoch 294/500
1/1 [==============================] - 0s 19ms/step - loss: 0.0947
Epoch 295/500
1/1 [==============================] - 0s 28ms/step - loss: 0.0940
Epoch 296/500
1/1 [==============================] - 0s 21ms/step - loss: 0.0934
Epoch 297/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0928
```

```
Epoch 298/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0921
Epoch 299/500
1/1 [==============================] - 0s 23ms/step - loss: 0.0915
Epoch 300/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0909
Epoch 301/500
1/1 [==============================] - 0s 23ms/step - loss: 0.0903
Epoch 302/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0897
Epoch 303/500
1/1 [==============================] - 0s 24ms/step - loss: 0.0892
Epoch 304/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0886
Epoch 305/500
1/1 [==============================] - 0s 45ms/step - loss: 0.0880
Epoch 306/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0875
Epoch 307/500
1/1 [==============================] - 0s 41ms/step - loss: 0.0869
Epoch 308/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0863
Epoch 309/500
1/1 [==============================] - 0s 23ms/step - loss: 0.0858
Epoch 310/500
1/1 [==============================] - 0s 38ms/step - loss: 0.0853
Epoch 311/500
1/1 [==============================] - 0s 21ms/step - loss: 0.0847
Epoch 312/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0842
Epoch 313/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0837
Epoch 314/500
1/1 [==============================] - 0s 19ms/step - loss: 0.0832
Epoch 315/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0827
Epoch 316/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0822
Epoch 317/500
1/1 [==============================] - 0s 18ms/step - loss: 0.0817
Epoch 318/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0812
Epoch 319/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0807
Epoch 320/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0802
Epoch 321/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0797
```

```
Epoch 322/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0793
Epoch 323/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0788
Epoch 324/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0784
Epoch 325/500
1/1 [==============================] - 0s 59ms/step - loss: 0.0779
Epoch 326/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0775
Epoch 327/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0770
Epoch 328/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0766
Epoch 329/500
1/1 [==============================] - 0s 32ms/step - loss: 0.0761
Epoch 330/500
1/1 [==============================] - 0s 23ms/step - loss: 0.0757
Epoch 331/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0753
Epoch 332/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0749
Epoch 333/500
1/1 [==============================] - 0s 23ms/step - loss: 0.0745
Epoch 334/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0741
Epoch 335/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0736
Epoch 336/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0733
Epoch 337/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0729
Epoch 338/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0725
Epoch 339/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0721
Epoch 340/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0717
Epoch 341/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0713
Epoch 342/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0710
Epoch 343/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0706
Epoch 344/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0702
Epoch 345/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0699
```

```
Epoch 346/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0695
Epoch 347/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0692
Epoch 348/500
1/1 [==============================] - 0s 6ms/step - loss: 0.0688
Epoch 349/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0685
Epoch 350/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0681
Epoch 351/500
1/1 [==============================] - 0s 20ms/step - loss: 0.0678
Epoch 352/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0675
Epoch 353/500
1/1 [==============================] - 0s 32ms/step - loss: 0.0671
Epoch 354/500
1/1 [==============================] - 0s 6ms/step - loss: 0.0668
Epoch 355/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0665
Epoch 356/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0662
Epoch 357/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0659
Epoch 358/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0655
Epoch 359/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0652
Epoch 360/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0649
Epoch 361/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0646
Epoch 362/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0643
Epoch 363/500
1/1 [==============================] - 0s 20ms/step - loss: 0.0640
Epoch 364/500
1/1 [==============================] - 0s 37ms/step - loss: 0.0638
Epoch 365/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0635
Epoch 366/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0632
Epoch 367/500
1/1 [==============================] - 0s 18ms/step - loss: 0.0629
Epoch 368/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0626
Epoch 369/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0624
```

```
Epoch 370/500
1/1 [==============================] - 0s 20ms/step - loss: 0.0621
Epoch 371/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0618
Epoch 372/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0616
Epoch 373/500
1/1 [==============================] - 0s 18ms/step - loss: 0.0613
Epoch 374/500
1/1 [==============================] - 0s 23ms/step - loss: 0.0610
Epoch 375/500
1/1 [==============================] - 0s 31ms/step - loss: 0.0608
Epoch 376/500
1/1 [==============================] - 0s 25ms/step - loss: 0.0605
Epoch 377/500
1/1 [==============================] - 0s 22ms/step - loss: 0.0603
Epoch 378/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0600
Epoch 379/500
1/1 [==============================] - 0s 28ms/step - loss: 0.0598
Epoch 380/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0596
Epoch 381/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0593
Epoch 382/500
1/1 [==============================] - 0s 24ms/step - loss: 0.0591
Epoch 383/500
1/1 [==============================] - 0s 40ms/step - loss: 0.0589
Epoch 384/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0586
Epoch 385/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0584
Epoch 386/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0582
Epoch 387/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0580
Epoch 388/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0577
Epoch 389/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0575
Epoch 390/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0573
Epoch 391/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0571
Epoch 392/500
1/1 [==============================] - 0s 30ms/step - loss: 0.0569
Epoch 393/500
1/1 [==============================] - 0s 21ms/step - loss: 0.0567
```

```
Epoch 394/500
1/1 [==============================] - 0s 28ms/step - loss: 0.0565
Epoch 395/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0563
Epoch 396/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0561
Epoch 397/500
1/1 [==============================] - 0s 20ms/step - loss: 0.0559
Epoch 398/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0557
Epoch 399/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0555
Epoch 400/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0553
Epoch 401/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0551
Epoch 402/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0549
Epoch 403/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0547
Epoch 404/500
1/1 [==============================] - 0s 18ms/step - loss: 0.0545
Epoch 405/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0544
Epoch 406/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0542
Epoch 407/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0540
Epoch 408/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0538
Epoch 409/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0537
Epoch 410/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0535
Epoch 411/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0533
Epoch 412/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0532
Epoch 413/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0530
Epoch 414/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0528
Epoch 415/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0527
Epoch 416/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0525
Epoch 417/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0524
```

```
Epoch 418/500
1/1 [==============================] - 0s 26ms/step - loss: 0.0522
Epoch 419/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0520
Epoch 420/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0519
Epoch 421/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0517
Epoch 422/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0516
Epoch 423/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0514
Epoch 424/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0513
Epoch 425/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0512
Epoch 426/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0510
Epoch 427/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0509
Epoch 428/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0507
Epoch 429/500
1/1 [==============================] - 0s 19ms/step - loss: 0.0506
Epoch 430/500
1/1 [==============================] - 0s 18ms/step - loss: 0.0505
Epoch 431/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0503
Epoch 432/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0502
Epoch 433/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0501
Epoch 434/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0499
Epoch 435/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0498
Epoch 436/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0497
Epoch 437/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0496
Epoch 438/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0494
Epoch 439/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0493
Epoch 440/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0492
Epoch 441/500
1/1 [==============================] - 0s 22ms/step - loss: 0.0491
```

```
Epoch 442/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0490
Epoch 443/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0488
Epoch 444/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0487
Epoch 445/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0486
Epoch 446/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0485
Epoch 447/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0484
Epoch 448/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0483
Epoch 449/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0482
Epoch 450/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0481
Epoch 451/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0480
Epoch 452/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0479
Epoch 453/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0477
Epoch 454/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0476
Epoch 455/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0475
Epoch 456/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0474
Epoch 457/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0473
Epoch 458/500
1/1 [==============================] - 0s 20ms/step - loss: 0.0472
Epoch 459/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0471
Epoch 460/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0471
Epoch 461/500
1/1 [==============================] - 0s 24ms/step - loss: 0.0470
Epoch 462/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0469
Epoch 463/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0468
Epoch 464/500
1/1 [==============================] - 0s 21ms/step - loss: 0.0467
Epoch 465/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0466
```

```
Epoch 466/500
1/1 [==============================] - 0s 15ms/step - loss: 0.0465
Epoch 467/500
1/1 [==============================] - 0s 25ms/step - loss: 0.0464
Epoch 468/500
1/1 [==============================] - 0s 16ms/step - loss: 0.0463
Epoch 469/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0462
Epoch 470/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0462
Epoch 471/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0461
Epoch 472/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0460
Epoch 473/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0459
Epoch 474/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0458
Epoch 475/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0457
Epoch 476/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0457
Epoch 477/500
1/1 [==============================] - 0s 10ms/step - loss: 0.0456
Epoch 478/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0455
Epoch 479/500
1/1 [==============================] - 0s 17ms/step - loss: 0.0454
Epoch 480/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0454
Epoch 481/500
1/1 [==============================] - 0s 19ms/step - loss: 0.0453
Epoch 482/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0452
Epoch 483/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0451
Epoch 484/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0451
Epoch 485/500
1/1 [==============================] - 0s 14ms/step - loss: 0.0450
Epoch 486/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0449
Epoch 487/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0448
Epoch 488/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0448
Epoch 489/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0447
```

```
Epoch 490/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0446
Epoch 491/500
1/1 [==============================] - 0s 12ms/step - loss: 0.0446
Epoch 492/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0445
Epoch 493/500
1/1 [==============================] - 0s 27ms/step - loss: 0.0444
Epoch 494/500
1/1 [==============================] - 0s 13ms/step - loss: 0.0444
Epoch 495/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0443
Epoch 496/500
1/1 [==============================] - 0s 9ms/step - loss: 0.0442
Epoch 497/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0442
Epoch 498/500
1/1 [==============================] - 0s 7ms/step - loss: 0.0441
Epoch 499/500
1/1 [==============================] - 0s 8ms/step - loss: 0.0441
Epoch 500/500
1/1 [==============================] - 0s 11ms/step - loss: 0.0440
```

[2]: <keras.src.callbacks.History at 0x7a350f39ebf0>

[3]:
```python
model.fit(xs, ys, epochs=50)
# it is observed that as the epoch increases the loss decreases
```

```
Epoch 1/50
1/1 [==============================] - 0s 12ms/step - loss: 0.0439
Epoch 2/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0439
Epoch 3/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0438
Epoch 4/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0438
Epoch 5/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0437
Epoch 6/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0436
Epoch 7/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0436
Epoch 8/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0435
Epoch 9/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0435
Epoch 10/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0434
```

```
Epoch 11/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0434
Epoch 12/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0433
Epoch 13/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0433
Epoch 14/50
1/1 [==============================] - 0s 9ms/step - loss: 0.0432
Epoch 15/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0432
Epoch 16/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0431
Epoch 17/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0431
Epoch 18/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0430
Epoch 19/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0430
Epoch 20/50
1/1 [==============================] - 0s 12ms/step - loss: 0.0429
Epoch 21/50
1/1 [==============================] - 0s 10ms/step - loss: 0.0429
Epoch 22/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0428
Epoch 23/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0428
Epoch 24/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0427
Epoch 25/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0427
Epoch 26/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0426
Epoch 27/50
1/1 [==============================] - 0s 9ms/step - loss: 0.0426
Epoch 28/50
1/1 [==============================] - 0s 14ms/step - loss: 0.0426
Epoch 29/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0425
Epoch 30/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0425
Epoch 31/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0424
Epoch 32/50
1/1 [==============================] - 0s 8ms/step - loss: 0.0424
Epoch 33/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0423
Epoch 34/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0423
```

```
Epoch 35/50
1/1 [==============================] - 0s 10ms/step - loss: 0.0423
Epoch 36/50
1/1 [==============================] - 0s 10ms/step - loss: 0.0422
Epoch 37/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0422
Epoch 38/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0421
Epoch 39/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0421
Epoch 40/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0421
Epoch 41/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0420
Epoch 42/50
1/1 [==============================] - 0s 10ms/step - loss: 0.0420
Epoch 43/50
1/1 [==============================] - 0s 11ms/step - loss: 0.0420
Epoch 44/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0419
Epoch 45/50
1/1 [==============================] - 0s 12ms/step - loss: 0.0419
Epoch 46/50
1/1 [==============================] - 0s 7ms/step - loss: 0.0418
Epoch 47/50
1/1 [==============================] - 0s 12ms/step - loss: 0.0418
Epoch 48/50
1/1 [==============================] - 0s 6ms/step - loss: 0.0418
Epoch 49/50
1/1 [==============================] - 0s 6ms/step - loss: 0.0417
Epoch 50/50
1/1 [==============================] - 0s 9ms/step - loss: 0.0417
```

[3]: `<keras.src.callbacks.History at 0x7a350ea156f0>`

[4]:
```python
print(model.predict([10.0]))

# the output should be Y = 3X + 1
```
```
1/1 [==============================] - 0s 94ms/step
[[4.6348715]]
```

[5]:
```python
print(model.predict([3.0]))
```
```
1/1 [==============================] - 0s 40ms/step
[[-0.18342805]]
```

[6]:
```python
print(model.predict([6.0]))
```

```
1/1 [==============================] - 0s 48ms/step
[[1.8815577]]
```

[7]:
```python
print(model.predict([9.0]))
```

```
1/1 [==============================] - 0s 64ms/step
[[3.9465435]]
```

[9]:
```python
xs = np.array([1.0, 2.0, 3.0, 4.0, 5.0, 6.0], dtype=float)
ys = np.array([1.0, 3.0, 5.0, 7.0, 9.0, 11.0], dtype=float)

# training the neural network
model.fit(xs, ys, epochs=100)
print(model.predict([10.0]))
```

```
Epoch 1/100
1/1 [==============================] - 0s 36ms/step - loss: 0.0040
Epoch 2/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0039
Epoch 3/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0039
Epoch 4/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0039
Epoch 5/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0039
Epoch 6/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0038
Epoch 7/100
1/1 [==============================] - 0s 20ms/step - loss: 0.0038
Epoch 8/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0038
Epoch 9/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0037
Epoch 10/100
1/1 [==============================] - 0s 18ms/step - loss: 0.0037
Epoch 11/100
1/1 [==============================] - 0s 22ms/step - loss: 0.0037
Epoch 12/100
1/1 [==============================] - 0s 11ms/step - loss: 0.0037
Epoch 13/100
1/1 [==============================] - 0s 10ms/step - loss: 0.0036
Epoch 14/100
1/1 [==============================] - 0s 11ms/step - loss: 0.0036
Epoch 15/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0036
Epoch 16/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0036
Epoch 17/100
```

```
1/1 [==============================] - 0s 13ms/step - loss: 0.0035
Epoch 18/100
1/1 [==============================] - 0s 11ms/step - loss: 0.0035
Epoch 19/100
1/1 [==============================] - 0s 11ms/step - loss: 0.0035
Epoch 20/100
1/1 [==============================] - 0s 18ms/step - loss: 0.0035
Epoch 21/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0034
Epoch 22/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0034
Epoch 23/100
1/1 [==============================] - 0s 42ms/step - loss: 0.0034
Epoch 24/100
1/1 [==============================] - 0s 23ms/step - loss: 0.0034
Epoch 25/100
1/1 [==============================] - 0s 20ms/step - loss: 0.0033
Epoch 26/100
1/1 [==============================] - 0s 12ms/step - loss: 0.0033
Epoch 27/100
1/1 [==============================] - 0s 25ms/step - loss: 0.0033
Epoch 28/100
1/1 [==============================] - 0s 23ms/step - loss: 0.0033
Epoch 29/100
1/1 [==============================] - 0s 36ms/step - loss: 0.0032
Epoch 30/100
1/1 [==============================] - 0s 31ms/step - loss: 0.0032
Epoch 31/100
1/1 [==============================] - 0s 20ms/step - loss: 0.0032
Epoch 32/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0032
Epoch 33/100
1/1 [==============================] - 0s 27ms/step - loss: 0.0031
Epoch 34/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0031
Epoch 35/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0031
Epoch 36/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0031
Epoch 37/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0030
Epoch 38/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0030
Epoch 39/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0030
Epoch 40/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0030
Epoch 41/100
```

```
1/1 [==============================] - 0s 14ms/step - loss: 0.0030
Epoch 42/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0029
Epoch 43/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0029
Epoch 44/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0029
Epoch 45/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0029
Epoch 46/100
1/1 [==============================] - 0s 18ms/step - loss: 0.0029
Epoch 47/100
1/1 [==============================] - 0s 27ms/step - loss: 0.0028
Epoch 48/100
1/1 [==============================] - 0s 25ms/step - loss: 0.0028
Epoch 49/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0028
Epoch 50/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0028
Epoch 51/100
1/1 [==============================] - 0s 29ms/step - loss: 0.0028
Epoch 52/100
1/1 [==============================] - 0s 20ms/step - loss: 0.0027
Epoch 53/100
1/1 [==============================] - 0s 24ms/step - loss: 0.0027
Epoch 54/100
1/1 [==============================] - 0s 11ms/step - loss: 0.0027
Epoch 55/100
1/1 [==============================] - 0s 19ms/step - loss: 0.0027
Epoch 56/100
1/1 [==============================] - 0s 12ms/step - loss: 0.0027
Epoch 57/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0026
Epoch 58/100
1/1 [==============================] - 0s 12ms/step - loss: 0.0026
Epoch 59/100
1/1 [==============================] - 0s 43ms/step - loss: 0.0026
Epoch 60/100
1/1 [==============================] - 0s 18ms/step - loss: 0.0026
Epoch 61/100
1/1 [==============================] - 0s 21ms/step - loss: 0.0026
Epoch 62/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0025
Epoch 63/100
1/1 [==============================] - 0s 10ms/step - loss: 0.0025
Epoch 64/100
1/1 [==============================] - 0s 10ms/step - loss: 0.0025
Epoch 65/100
```

```
1/1 [==============================] - 0s 21ms/step - loss: 0.0025
Epoch 66/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0025
Epoch 67/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0024
Epoch 68/100
1/1 [==============================] - 0s 45ms/step - loss: 0.0024
Epoch 69/100
1/1 [==============================] - 0s 35ms/step - loss: 0.0024
Epoch 70/100
1/1 [==============================] - 0s 46ms/step - loss: 0.0024
Epoch 71/100
1/1 [==============================] - 0s 33ms/step - loss: 0.0024
Epoch 72/100
1/1 [==============================] - 0s 30ms/step - loss: 0.0024
Epoch 73/100
1/1 [==============================] - 0s 28ms/step - loss: 0.0023
Epoch 74/100
1/1 [==============================] - 0s 25ms/step - loss: 0.0023
Epoch 75/100
1/1 [==============================] - 0s 21ms/step - loss: 0.0023
Epoch 76/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0023
Epoch 77/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0023
Epoch 78/100
1/1 [==============================] - 0s 20ms/step - loss: 0.0023
Epoch 79/100
1/1 [==============================] - 0s 21ms/step - loss: 0.0022
Epoch 80/100
1/1 [==============================] - 0s 19ms/step - loss: 0.0022
Epoch 81/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0022
Epoch 82/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0022
Epoch 83/100
1/1 [==============================] - 0s 17ms/step - loss: 0.0022
Epoch 84/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0022
Epoch 85/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0021
Epoch 86/100
1/1 [==============================] - 0s 18ms/step - loss: 0.0021
Epoch 87/100
1/1 [==============================] - 0s 16ms/step - loss: 0.0021
Epoch 88/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0021
Epoch 89/100
```

```
1/1 [==============================] - 0s 32ms/step - loss: 0.0021
Epoch 90/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0021
Epoch 91/100
1/1 [==============================] - 0s 19ms/step - loss: 0.0021
Epoch 92/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0020
Epoch 93/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0020
Epoch 94/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0020
Epoch 95/100
1/1 [==============================] - 0s 12ms/step - loss: 0.0020
Epoch 96/100
1/1 [==============================] - 0s 13ms/step - loss: 0.0020
Epoch 97/100
1/1 [==============================] - 0s 14ms/step - loss: 0.0020
Epoch 98/100
1/1 [==============================] - 0s 15ms/step - loss: 0.0020
Epoch 99/100
1/1 [==============================] - 0s 11ms/step - loss: 0.0019
Epoch 100/100
1/1 [==============================] - 0s 10ms/step - loss: 0.0019
1/1 [==============================] - 0s 96ms/step
[[19.133059]]
```

[10]:
```python
print(model.predict([7.0]))
```

```
1/1 [==============================] - 0s 39ms/step
[[13.063258]]
```

[11]:
```python
xs = np.array([3.0, 6.0, 9.0, 12.0, 15.0, 18.0], dtype=float)
ys = np.array([0.0, 2.0, 4.0, 6.0, 8.0, 10.0], dtype=float)

# training the neural network
model.fit(xs, ys, epochs=150)
print(model.predict([5.5]))
```

```
Epoch 1/150
1/1 [==============================] - 0s 13ms/step - loss: 277.6712
Epoch 2/150
1/1 [==============================] - 0s 11ms/step - loss: 846.4087
Epoch 3/150
1/1 [==============================] - 0s 10ms/step - loss: 2580.5667
Epoch 4/150
1/1 [==============================] - 0s 9ms/step - loss: 7868.2476
Epoch 5/150
1/1 [==============================] - 0s 8ms/step - loss: 23991.0859
```

```
Epoch 6/150
1/1 [==============================] - 0s 9ms/step - loss: 73151.7812
Epoch 7/150
1/1 [==============================] - 0s 8ms/step - loss: 223049.2656
Epoch 8/150
1/1 [==============================] - 0s 8ms/step - loss: 680106.4375
Epoch 9/150
1/1 [==============================] - 0s 10ms/step - loss: 2073734.3750
Epoch 10/150
1/1 [==============================] - 0s 11ms/step - loss: 6323091.5000
Epoch 11/150
1/1 [==============================] - 0s 12ms/step - loss: 19279938.0000
Epoch 12/150
1/1 [==============================] - 0s 9ms/step - loss: 58787108.0000
Epoch 13/150
1/1 [==============================] - 0s 17ms/step - loss: 179249712.0000
Epoch 14/150
1/1 [==============================] - 0s 14ms/step - loss: 546555968.0000
Epoch 15/150
1/1 [==============================] - 0s 17ms/step - loss: 1666521472.0000
Epoch 16/150
1/1 [==============================] - 0s 8ms/step - loss: 5081444864.0000
Epoch 17/150
1/1 [==============================] - 0s 9ms/step - loss: 15493996544.0000
Epoch 18/150
1/1 [==============================] - 0s 15ms/step - loss: 47243251712.0000
Epoch 19/150
1/1 [==============================] - 0s 11ms/step - loss: 144050946048.0000
Epoch 20/150
1/1 [==============================] - 0s 8ms/step - loss: 439230234624.0000
Epoch 21/150
1/1 [==============================] - 0s 12ms/step - loss: 1339271282688.0000
Epoch 22/150
1/1 [==============================] - 0s 9ms/step - loss: 4083616055296.0000
Epoch 23/150
1/1 [==============================] - 0s 11ms/step - loss: 12451484532736.0000
Epoch 24/150
1/1 [==============================] - 0s 9ms/step - loss: 37966214856704.0000
Epoch 25/150
1/1 [==============================] - 0s 12ms/step - loss: 115764031913984.0000
Epoch 26/150
1/1 [==============================] - 0s 9ms/step - loss: 352979974619136.0000
Epoch 27/150
1/1 [==============================] - 0s 9ms/step - loss: 1076282834026496.0000
Epoch 28/150
1/1 [==============================] - 0s 8ms/step - loss: 3281728944734208.0000
Epoch 29/150
1/1 [==============================] - 0s 8ms/step - loss:
```

```
10006425543639040.0000
Epoch 30/150
1/1 [==============================] - 0s 10ms/step - loss:
30510912947355648.0000
Epoch 31/150
1/1 [==============================] - 0s 10ms/step - loss:
93031817719840768.0000
Epoch 32/150
1/1 [==============================] - 0s 9ms/step - loss:
283666320564682752.0000
Epoch 33/150
1/1 [==============================] - 0s 8ms/step - loss:
864936113389699072.0000
Epoch 34/150
1/1 [==============================] - 0s 8ms/step - loss:
2637305632813744128.0000
Epoch 35/150
1/1 [==============================] - 0s 9ms/step - loss:
8041493794018820096.0000
Epoch 36/150
1/1 [==============================] - 0s 11ms/step - loss:
24519584288427999232.0000
Epoch 37/150
1/1 [==============================] - 0s 9ms/step - loss:
74763448173419560960.0000
Epoch 38/150
1/1 [==============================] - 0s 10ms/step - loss:
227963628150704832512.0000
Epoch 39/150
1/1 [==============================] - 0s 10ms/step - loss:
695090984881664032768.0000
Epoch 40/150
1/1 [==============================] - 0s 9ms/step - loss:
2119424806150505234432.0000
Epoch 41/150
1/1 [==============================] - 0s 9ms/step - loss:
6462407071248041377792.0000
Epoch 42/150
1/1 [==============================] - 0s 8ms/step - loss:
19704734557622952263680.0000
Epoch 43/150
1/1 [==============================] - 0s 8ms/step - loss:
60082328973965810204672.0000
Epoch 44/150
1/1 [==============================] - 0s 10ms/step - loss:
183198938851651832774656.0000
Epoch 45/150
1/1 [==============================] - 0s 10ms/step - loss:
```

5585978188566092285521472.0000
Epoch 46/150
1/1 [==============================] - 0s 9ms/step - loss:
170323904121736982539840.0000
Epoch 47/150
1/1 [==============================] - 0s 11ms/step - loss:
519340178694880940516608.0000
Epoch 48/150
1/1 [==============================] - 0s 8ms/step - loss:
158353734070105293948190872.0000
Epoch 49/150
1/1 [==============================] - 0s 7ms/step - loss:
482841496987499405498122224.0000
Epoch 50/150
1/1 [==============================] - 0s 9ms/step - loss:
147224718830872943696805888.0000
Epoch 51/150
1/1 [==============================] - 0s 12ms/step - loss:
448907752033218852403806208.0000
Epoch 52/150
1/1 [==============================] - 0s 8ms/step - loss:
136877940079929256195391480.0000
Epoch 53/150
1/1 [==============================] - 0s 8ms/step - loss:
417359060407204502076129280.0000
Epoch 54/150
1/1 [==============================] - 0s 7ms/step - loss:
127258284756706370522227670104.0000
Epoch 55/150
1/1 [==============================] - 0s 7ms/step - loss:
388027291105270936177842585560.0000
Epoch 56/150
1/1 [==============================] - 0s 9ms/step - loss:
118314670432663275366332235776.0000
Epoch 57/150
1/1 [==============================] - 0s 8ms/step - loss:
360757102767407873267700072448.0000
Epoch 58/150
1/1 [==============================] - 0s 8ms/step - loss:
109999623865902654614818678374.0000
Epoch 59/150
1/1 [==============================] - 0s 9ms/step - loss:
335403472699518007258600439808080.0000
Epoch 60/150
1/1 [==============================] - 0s 9ms/step - loss:
102268970906975789717643235164166.0000
Epoch 61/150
1/1 [==============================] - 0s 11ms/step - loss:

31183160737276624083063622598656.0000
Epoch 62/150
1/1 [==============================] - 0s 10ms/step - loss:
95081580499395523324137848176640.0000
Epoch 63/150
1/1 [==============================] - 0s 10ms/step - loss:
28991635002159387536558033102438 4.0000
Epoch 64/150
1/1 [==============================] - 0s 7ms/step - loss:
88399325238431394355733340356608 0.0000
Epoch 65/150
1/1 [==============================] - 0s 9ms/step - loss:
26954126513175120316080344405114 88.0000
Epoch 66/150
1/1 [==============================] - 0s 8ms/step - loss:
82186709224452271485623992823316 48.0000
Epoch 67/150
1/1 [==============================] - 0s 9ms/step - loss:
25059815809780159994866405728059 392.0000
Epoch 68/150
1/1 [==============================] - 0s 9ms/step - loss:
76410690213013326352211137146126 336.0000
Epoch 69/150
1/1 [==============================] - 0s 10ms/step - loss:
23298625750569713756133469475307 5200.0000
Epoch 70/150
1/1 [==============================] - 0s 9ms/step - loss:
71040597434980238123686968837957 2224.0000
Epoch 71/150
1/1 [==============================] - 0s 9ms/step - loss:
21661215731324162405800944478283 440128.0000
Epoch 72/150
1/1 [==============================] - 0s 7ms/step - loss:
66047898501704346355569135911939 60448.0000
Epoch 73/150
1/1 [==============================] - 0s 9ms/step - loss:
20138879864440829149962787065587 302400.0000
Epoch 74/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 75/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 76/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 77/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 78/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 79/150

```
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 80/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 81/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 82/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 83/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 84/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 85/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 86/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 87/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 88/150
1/1 [==============================] - 0s 12ms/step - loss: inf
Epoch 89/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 90/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 91/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 92/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 93/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 94/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 95/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 96/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 97/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 98/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 99/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 100/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 101/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 102/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 103/150
```

```
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 104/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 105/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 106/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 107/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 108/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 109/150
1/1 [==============================] - 0s 12ms/step - loss: inf
Epoch 110/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 111/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 112/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 113/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 114/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 115/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 116/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 117/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 118/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 119/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 120/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 121/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 122/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 123/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 124/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 125/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 126/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 127/150
```

```
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 128/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 129/150
1/1 [==============================] - 0s 6ms/step - loss: inf
Epoch 130/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 131/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 132/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 133/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 134/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 135/150
1/1 [==============================] - 0s 10ms/step - loss: inf
Epoch 136/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 137/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 138/150
1/1 [==============================] - 0s 7ms/step - loss: inf
Epoch 139/150
1/1 [==============================] - 0s 11ms/step - loss: inf
Epoch 140/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 141/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 142/150
1/1 [==============================] - 0s 6ms/step - loss: inf
Epoch 143/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 144/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 145/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 146/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 147/150
1/1 [==============================] - 0s 9ms/step - loss: inf
Epoch 148/150
1/1 [==============================] - 0s 12ms/step - loss: inf
Epoch 149/150
1/1 [==============================] - 0s 8ms/step - loss: inf
Epoch 150/150
1/1 [==============================] - 0s 7ms/step - loss: inf
1/1 [==============================] - 0s 69ms/step
```

```
[[inf]]
```

```
[12]: xs = np.array([3.0, 6.0, 9.0, 12.0, 15.0, 18.0], dtype=float)
      ys = np.array([0.0, 2.0, 4.0, 6.0, 8.0, 10.0], dtype=float)

      # training the neural network
      model.fit(xs, ys, epochs=300)
      print(model.predict([5.5]))
```

```
Epoch 1/300
1/1 [==============================] - 0s 13ms/step - loss: inf
Epoch 2/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 3/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 4/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 5/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 6/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 7/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 8/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 9/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 10/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 11/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 12/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 13/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 14/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 15/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 16/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 17/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 18/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 19/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 20/300
```

```
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 21/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 22/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 23/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 24/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 25/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 26/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 27/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 28/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 29/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 30/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 31/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 32/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 33/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 34/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 35/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 36/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 37/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 38/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 39/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 40/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 41/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 42/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 43/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 44/300
```

```
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 45/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 46/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 47/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 48/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 49/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 50/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 51/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 52/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 53/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 54/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 55/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 56/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 57/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 58/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 59/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 60/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 61/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 62/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 63/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 64/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 65/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 66/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 67/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 68/300
```

```
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 69/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 70/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 71/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 72/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 73/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 74/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 75/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 76/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 77/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 78/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 79/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 80/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 81/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 82/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 83/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 84/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 85/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 86/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 87/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 88/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 89/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 90/300
1/1 [==============================] - 0s 15ms/step - loss: nan
Epoch 91/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 92/300
```

```
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 93/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 94/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 95/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 96/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 97/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 98/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 99/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 100/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 101/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 102/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 103/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 104/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 105/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 106/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 107/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 108/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 109/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 110/300
1/1 [==============================] - 0s 17ms/step - loss: nan
Epoch 111/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 112/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 113/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 114/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 115/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 116/300
```

```
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 117/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 118/300
1/1 [==============================] - 0s 15ms/step - loss: nan
Epoch 119/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 120/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 121/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 122/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 123/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 124/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 125/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 126/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 127/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 128/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 129/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 130/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 131/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 132/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 133/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 134/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 135/300
1/1 [==============================] - 0s 15ms/step - loss: nan
Epoch 136/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 137/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 138/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 139/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 140/300
```

```
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 141/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 142/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 143/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 144/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 145/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 146/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 147/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 148/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 149/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 150/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 151/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 152/300
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 153/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 154/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 155/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 156/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 157/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 158/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 159/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 160/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 161/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 162/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 163/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 164/300
```

```
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 165/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 166/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 167/300
1/1 [==============================] - 0s 15ms/step - loss: nan
Epoch 168/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 169/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 170/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 171/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 172/300
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 173/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 174/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 175/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 176/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 177/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 178/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 179/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 180/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 181/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 182/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 183/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 184/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 185/300
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 186/300
1/1 [==============================] - 0s 15ms/step - loss: nan
Epoch 187/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 188/300
```

```
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 189/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 190/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 191/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 192/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 193/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 194/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 195/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 196/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 197/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 198/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 199/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 200/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 201/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 202/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 203/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 204/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 205/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 206/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 207/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 208/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 209/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 210/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 211/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 212/300
```

```
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 213/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 214/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 215/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 216/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 217/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 218/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 219/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 220/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 221/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 222/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 223/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 224/300
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 225/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 226/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 227/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 228/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 229/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 230/300
1/1 [==============================] - 0s 14ms/step - loss: nan
Epoch 231/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 232/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 233/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 234/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 235/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 236/300
```

```
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 237/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 238/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 239/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 240/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 241/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 242/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 243/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 244/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 245/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 246/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 247/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 248/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 249/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 250/300
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 251/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 252/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 253/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 254/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 255/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 256/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 257/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 258/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 259/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 260/300
```

```
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 261/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 262/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 263/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 264/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 265/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 266/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 267/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 268/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 269/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 270/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 271/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 272/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 273/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 274/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 275/300
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 276/300
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 277/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 278/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 279/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 280/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 281/300
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 282/300
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 283/300
1/1 [==============================] - 0s 5ms/step - loss: nan
Epoch 284/300
```

```
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 285/300
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 286/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 287/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 288/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 289/300
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 290/300
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 291/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 292/300
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 293/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 294/300
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 295/300
1/1 [==============================] - 0s 5ms/step - loss: nan
Epoch 296/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 297/300
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 298/300
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 299/300
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 300/300
1/1 [==============================] - 0s 6ms/step - loss: nan
1/1 [==============================] - 0s 91ms/step
[[nan]]
```

```python
xs = np.array([3.0, 6.0, 9.0, 12.0, 15.0, 18.0], dtype=float)
ys = np.array([0.0, 2.0, 4.0, 6.0, 8.0, 10.0], dtype=float)

# training the neural network
model.fit(xs, ys, epochs=150)
print(model.predict([8.0]))
```

```
Epoch 1/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 2/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 3/150
```

49

```
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 4/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 5/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 6/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 7/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 8/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 9/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 10/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 11/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 12/150
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 13/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 14/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 15/150
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 16/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 17/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 18/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 19/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 20/150
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 21/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 22/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 23/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 24/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 25/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 26/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 27/150
```

```
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 28/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 29/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 30/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 31/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 32/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 33/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 34/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 35/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 36/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 37/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 38/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 39/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 40/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 41/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 42/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 43/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 44/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 45/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 46/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 47/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 48/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 49/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 50/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 51/150
```

```
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 52/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 53/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 54/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 55/150
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 56/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 57/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 58/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 59/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 60/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 61/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 62/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 63/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 64/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 65/150
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 66/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 67/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 68/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 69/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 70/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 71/150
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 72/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 73/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 74/150
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 75/150
```

```
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 76/150
1/1 [==============================] - 0s 13ms/step - loss: nan
Epoch 77/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 78/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 79/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 80/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 81/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 82/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 83/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 84/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 85/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 86/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 87/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 88/150
1/1 [==============================] - 0s 11ms/step - loss: nan
Epoch 89/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 90/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 91/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 92/150
1/1 [==============================] - 0s 15ms/step - loss: nan
Epoch 93/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 94/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 95/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 96/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 97/150
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 98/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 99/150
```

```
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 100/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 101/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 102/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 103/150
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 104/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 105/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 106/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 107/150
1/1 [==============================] - 0s 12ms/step - loss: nan
Epoch 108/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 109/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 110/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 111/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 112/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 113/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 114/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 115/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 116/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 117/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 118/150
1/1 [==============================] - 0s 10ms/step - loss: nan
Epoch 119/150
1/1 [==============================] - 0s 9ms/step - loss: nan
Epoch 120/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 121/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 122/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 123/150
```

```
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 124/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 125/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 126/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 127/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 128/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 129/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 130/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 131/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 132/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 133/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 134/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 135/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 136/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 137/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 138/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 139/150
1/1 [==============================] - 0s 5ms/step - loss: nan
Epoch 140/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 141/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 142/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 143/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 144/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 145/150
1/1 [==============================] - 0s 6ms/step - loss: nan
Epoch 146/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 147/150
```

```
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 148/150
1/1 [==============================] - 0s 7ms/step - loss: nan
Epoch 149/150
1/1 [==============================] - 0s 8ms/step - loss: nan
Epoch 150/150
1/1 [==============================] - 0s 7ms/step - loss: nan
1/1 [==============================] - 0s 41ms/step
[[nan]]
```