C1W1_Assignment

September 10, 2022

1 Week 1 Assignment: Housing Prices

In this exercise you'll try to build a neural network that predicts the price of a house according to a simple formula.

Imagine that house pricing is as easy as:

A house has a base cost of 50k, and every additional bedroom adds a cost of 50k. This will make a 1 bedroom house cost 100k, a 2 bedroom house cost 150k etc.

How would you create a neural network that learns this relationship so that it would predict a 7 bedroom house as costing close to 400k etc.

Hint: Your network might work better if you scale the house price down. You don't have to give the answer 400...it might be better to create something that predicts the number 4, and then your answer is in the 'hundreds of thousands' etc.

```python
[5]: import tensorflow as tf
     import numpy as np
     from tensorflow import keras
```

```python
[11]: # GRADED FUNCTION: house_model
      def house_model():
          ### START CODE HERE

          # Define input and output tensors with the values for houses with 1 up to 6
          ↪bedrooms
          # Hint: Remember to explictly set the dtype as float
          #number of bedrooms
          xs = np.arange(1, 11, dtype = float)
          print(xs)
          # for each bedroom cost = 50k, base cost 50k. So total price 1 bedroom
          ↪100k, 2 bedroom 150kand so on

          start=1
          step=0.5
          num=10

          ys = np.arange(0,num)*step+start
          print(ys)
```

```
        # Define your model (should be a model with 1 dense layer and 1 unit)
        model = tf.keras.Sequential([keras.layers.Dense(units=1, input_shape=[1])])

        # Compile your model
        # Set the optimizer to Stochastic Gradient Descent
        # and use Mean Squared Error as the loss function
        model.compile(optimizer='sgd', loss='mean_squared_error')

        # Train your model for 1000 epochs by feeding the i/o tensors
        model.fit(xs, ys, epochs=1000) # Simple, taken from reading materials

        ### END CODE HERE
        return model
```

Now that you have a function that returns a compiled and trained model when invoked, use it to get the model to predict the price of houses:

```
[12]: # Get your trained model
      model = house_model()
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1/1 [==============================] - 0s 180ms/step - loss: 16.2859
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Epoch 3/1000
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Epoch 4/1000
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Epoch 9/1000
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Epoch 11/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0689
Epoch 12/1000
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Epoch 13/1000
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1/1 [==============================] - 0s 2ms/step - loss: 0.0088
Epoch 256/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0088
Epoch 257/1000
1/1 [==============================] - 0s 8ms/step - loss: 0.0087
Epoch 258/1000
1/1 [==============================] - 0s 4ms/step - loss: 0.0086
Epoch 259/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0085
Epoch 260/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0085
Epoch 261/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0084
Epoch 262/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0083
Epoch 263/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0083
Epoch 264/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0082
Epoch 265/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0081
Epoch 266/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0081
Epoch 267/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0080
Epoch 268/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0079
Epoch 269/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0079
Epoch 270/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0078
Epoch 271/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0077
Epoch 272/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0077
Epoch 273/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0076
Epoch 274/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0075
Epoch 275/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0075
Epoch 276/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0074
Epoch 277/1000
```

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1/1 [==============================] - 0s 3ms/step - loss: 0.0073
Epoch 278/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0073
Epoch 279/1000
1/1 [==============================] - 0s 13ms/step - loss: 0.0072
Epoch 280/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0072
Epoch 281/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0071
Epoch 282/1000
1/1 [==============================] - 0s 4ms/step - loss: 0.0070
Epoch 283/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0070
Epoch 284/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0069
Epoch 285/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0069
Epoch 286/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0068
Epoch 287/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0067
Epoch 288/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0067
Epoch 289/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0066
Epoch 290/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0066
Epoch 291/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0065
Epoch 292/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0065
Epoch 293/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0064
Epoch 294/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0064
Epoch 295/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0063
Epoch 296/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0063
Epoch 297/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0062
Epoch 298/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0062
Epoch 299/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0061
Epoch 300/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0060
Epoch 301/1000
```

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1/1 [==============================] - 0s 2ms/step - loss: 0.0060
Epoch 302/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0059
Epoch 303/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0059
Epoch 304/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0058
Epoch 305/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0058
Epoch 306/1000
1/1 [==============================] - 0s 8ms/step - loss: 0.0058
Epoch 307/1000
1/1 [==============================] - 0s 5ms/step - loss: 0.0057
Epoch 308/1000
1/1 [==============================] - 0s 4ms/step - loss: 0.0057
Epoch 309/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0056
Epoch 310/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0056
Epoch 311/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0055
Epoch 312/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0055
Epoch 313/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0054
Epoch 314/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0054
Epoch 315/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0053
Epoch 316/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0053
Epoch 317/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0052
Epoch 318/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0052
Epoch 319/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0052
Epoch 320/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0051
Epoch 321/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0051
Epoch 322/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0050
Epoch 323/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0050
Epoch 324/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0049
Epoch 325/1000
```

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1/1 [==============================] - 0s 2ms/step - loss: 0.0049
Epoch 326/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0049
Epoch 327/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0048
Epoch 328/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0048
Epoch 329/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0047
Epoch 330/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0047
Epoch 331/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0047
Epoch 332/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0046
Epoch 333/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0046
Epoch 334/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0045
Epoch 335/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0045
Epoch 336/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0045
Epoch 337/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0044
Epoch 338/1000
1/1 [==============================] - 0s 6ms/step - loss: 0.0044
Epoch 339/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0044
Epoch 340/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0043
Epoch 341/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0043
Epoch 342/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0042
Epoch 343/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0042
Epoch 344/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0042
Epoch 345/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0041
Epoch 346/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0041
Epoch 347/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0041
Epoch 348/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0040
Epoch 349/1000
```

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1/1 [==============================] - 0s 2ms/step - loss: 0.0040
Epoch 350/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0040
Epoch 351/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0039
Epoch 352/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0039
Epoch 353/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0039
Epoch 354/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0038
Epoch 355/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0038
Epoch 356/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0038
Epoch 357/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0037
Epoch 358/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0037
Epoch 359/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0037
Epoch 360/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0037
Epoch 361/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0036
Epoch 362/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0036
Epoch 363/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0036
Epoch 364/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0035
Epoch 365/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0035
Epoch 366/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0035
Epoch 367/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0034
Epoch 368/1000
1/1 [==============================] - 0s 15ms/step - loss: 0.0034
Epoch 369/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0034
Epoch 370/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0034
Epoch 371/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0033
Epoch 372/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0033
Epoch 373/1000
```

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1/1 [==============================] - 0s 2ms/step - loss: 0.0033
Epoch 374/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0032
Epoch 375/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0032
Epoch 376/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0032
Epoch 377/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0032
Epoch 378/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0031
Epoch 379/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0031
Epoch 380/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0031
Epoch 381/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0031
Epoch 382/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0030
Epoch 383/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0030
Epoch 384/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0030
Epoch 385/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0030
Epoch 386/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0029
Epoch 387/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0029
Epoch 388/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0029
Epoch 389/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0029
Epoch 390/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0028
Epoch 391/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0028
Epoch 392/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0028
Epoch 393/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0028
Epoch 394/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0027
Epoch 395/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0027
Epoch 396/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0027
Epoch 397/1000
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1/1 [==============================] - 0s 1ms/step - loss: 0.0027
Epoch 398/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0027
Epoch 399/1000
1/1 [==============================] - 0s 5ms/step - loss: 0.0026
Epoch 400/1000
1/1 [==============================] - 0s 4ms/step - loss: 0.0026
Epoch 401/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0026
Epoch 402/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0026
Epoch 403/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0025
Epoch 404/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0025
Epoch 405/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0025
Epoch 406/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0025
Epoch 407/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0025
Epoch 408/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0024
Epoch 409/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0024
Epoch 410/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0024
Epoch 411/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0024
Epoch 412/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0024
Epoch 413/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0023
Epoch 414/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0023
Epoch 415/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0023
Epoch 416/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0023
Epoch 417/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0023
Epoch 418/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0022
Epoch 419/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0022
Epoch 420/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0022
Epoch 421/1000
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1/1 [==============================] - 0s 1ms/step - loss: 0.0022
Epoch 422/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0022
Epoch 423/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0021
Epoch 424/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0021
Epoch 425/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0021
Epoch 426/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0021
Epoch 427/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0021
Epoch 428/1000
1/1 [==============================] - 0s 6ms/step - loss: 0.0021
Epoch 429/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0020
Epoch 430/1000
1/1 [==============================] - 0s 4ms/step - loss: 0.0020
Epoch 431/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0020
Epoch 432/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0020
Epoch 433/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0020
Epoch 434/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0020
Epoch 435/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0019
Epoch 436/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0019
Epoch 437/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0019
Epoch 438/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0019
Epoch 439/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0019
Epoch 440/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0019
Epoch 441/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0018
Epoch 442/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0018
Epoch 443/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0018
Epoch 444/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0018
Epoch 445/1000
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1/1 [==============================] - 0s 2ms/step - loss: 0.0018
Epoch 446/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0018
Epoch 447/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0018
Epoch 448/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0017
Epoch 449/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0017
Epoch 450/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0017
Epoch 451/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0017
Epoch 452/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0017
Epoch 453/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0017
Epoch 454/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0017
Epoch 455/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0016
Epoch 456/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0016
Epoch 457/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0016
Epoch 458/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0016
Epoch 459/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0016
Epoch 460/1000
1/1 [==============================] - 0s 5ms/step - loss: 0.0016
Epoch 461/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0016
Epoch 462/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0015
Epoch 463/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 464/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 465/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 466/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 467/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 468/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 469/1000
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1/1 [==============================] - 0s 2ms/step - loss: 0.0015
Epoch 470/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0014
Epoch 471/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0014
Epoch 472/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0014
Epoch 473/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0014
Epoch 474/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0014
Epoch 475/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0014
Epoch 476/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0014
Epoch 477/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0014
Epoch 478/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0014
Epoch 479/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0013
Epoch 480/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0013
Epoch 481/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0013
Epoch 482/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0013
Epoch 483/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0013
Epoch 484/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0013
Epoch 485/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0013
Epoch 486/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0013
Epoch 487/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0013
Epoch 488/1000
1/1 [==============================] - 0s 15ms/step - loss: 0.0012
Epoch 489/1000
1/1 [==============================] - 0s 3ms/step - loss: 0.0012
Epoch 490/1000
1/1 [==============================] - 0s 5ms/step - loss: 0.0012
Epoch 491/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0012
Epoch 492/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0012
Epoch 493/1000
```

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1/1 [==============================] - 0s 2ms/step - loss: 0.0012
Epoch 494/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0012
Epoch 495/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0012
Epoch 496/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0012
Epoch 497/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0012
Epoch 498/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 499/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 500/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 501/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0011
Epoch 502/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0011
Epoch 503/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 504/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 505/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 506/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 507/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 508/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0011
Epoch 509/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0010
Epoch 510/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0010
Epoch 511/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0010
Epoch 512/1000
1/1 [==============================] - 0s 2ms/step - loss: 0.0010
Epoch 513/1000
1/1 [==============================] - 0s 1ms/step - loss: 0.0010
Epoch 514/1000
1/1 [==============================] - 0s 2ms/step - loss: 9.9885e-04
Epoch 515/1000
1/1 [==============================] - 0s 1ms/step - loss: 9.9048e-04
Epoch 516/1000
1/1 [==============================] - 0s 1ms/step - loss: 9.8218e-04
Epoch 517/1000
```

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1/1 [==============================] - 0s 2ms/step - loss: 9.7395e-04
Epoch 518/1000
1/1 [==============================] - 0s 1ms/step - loss: 9.6578e-04
Epoch 519/1000
1/1 [==============================] - 0s 2ms/step - loss: 9.5769e-04
Epoch 520/1000
1/1 [==============================] - 0s 1ms/step - loss: 9.4966e-04
Epoch 521/1000
1/1 [==============================] - 0s 11ms/step - loss: 9.4170e-04
Epoch 522/1000
1/1 [==============================] - 0s 4ms/step - loss: 9.3381e-04
Epoch 523/1000
1/1 [==============================] - 0s 2ms/step - loss: 9.2598e-04
Epoch 524/1000
1/1 [==============================] - 0s 3ms/step - loss: 9.1822e-04
Epoch 525/1000
1/1 [==============================] - 0s 2ms/step - loss: 9.1052e-04
Epoch 526/1000
1/1 [==============================] - 0s 2ms/step - loss: 9.0289e-04
Epoch 527/1000
1/1 [==============================] - 0s 3ms/step - loss: 8.9532e-04
Epoch 528/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.8782e-04
Epoch 529/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.8038e-04
Epoch 530/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.7300e-04
Epoch 531/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.6568e-04
Epoch 532/1000
1/1 [==============================] - 0s 3ms/step - loss: 8.5843e-04
Epoch 533/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.5123e-04
Epoch 534/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.4410e-04
Epoch 535/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.3703e-04
Epoch 536/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.3001e-04
Epoch 537/1000
1/1 [==============================] - 0s 3ms/step - loss: 8.2305e-04
Epoch 538/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.1615e-04
Epoch 539/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.0931e-04
Epoch 540/1000
1/1 [==============================] - 0s 2ms/step - loss: 8.0253e-04
Epoch 541/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 7.9580e-04
Epoch 542/1000
1/1 [==============================] - 0s 1ms/step - loss: 7.8913e-04
Epoch 543/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.8252e-04
Epoch 544/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.7596e-04
Epoch 545/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.6945e-04
Epoch 546/1000
1/1 [==============================] - 0s 1ms/step - loss: 7.6301e-04
Epoch 547/1000
1/1 [==============================] - 0s 1ms/step - loss: 7.5661e-04
Epoch 548/1000
1/1 [==============================] - 0s 1ms/step - loss: 7.5027e-04
Epoch 549/1000
1/1 [==============================] - 0s 1ms/step - loss: 7.4398e-04
Epoch 550/1000
1/1 [==============================] - 0s 1ms/step - loss: 7.3774e-04
Epoch 551/1000
1/1 [==============================] - 0s 3ms/step - loss: 7.3156e-04
Epoch 552/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.2543e-04
Epoch 553/1000
1/1 [==============================] - 0s 3ms/step - loss: 7.1935e-04
Epoch 554/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.1332e-04
Epoch 555/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.0734e-04
Epoch 556/1000
1/1 [==============================] - 0s 2ms/step - loss: 7.0141e-04
Epoch 557/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.9553e-04
Epoch 558/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.8970e-04
Epoch 559/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.8393e-04
Epoch 560/1000
1/1 [==============================] - 0s 1ms/step - loss: 6.7819e-04
Epoch 561/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.7251e-04
Epoch 562/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.6687e-04
Epoch 563/1000
1/1 [==============================] - 0s 1ms/step - loss: 6.6128e-04
Epoch 564/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.5574e-04
Epoch 565/1000
```

```
1/1 [==============================] - 0s 1ms/step - loss: 6.5024e-04
Epoch 566/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.4479e-04
Epoch 567/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.3939e-04
Epoch 568/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.3403e-04
Epoch 569/1000
1/1 [==============================] - 0s 1ms/step - loss: 6.2872e-04
Epoch 570/1000
1/1 [==============================] - 0s 1ms/step - loss: 6.2345e-04
Epoch 571/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.1822e-04
Epoch 572/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.1304e-04
Epoch 573/1000
1/1 [==============================] - 0s 2ms/step - loss: 6.0790e-04
Epoch 574/1000
1/1 [==============================] - 0s 1ms/step - loss: 6.0280e-04
Epoch 575/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.9775e-04
Epoch 576/1000
1/1 [==============================] - 0s 1ms/step - loss: 5.9274e-04
Epoch 577/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.8777e-04
Epoch 578/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.8285e-04
Epoch 579/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.7796e-04
Epoch 580/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.7312e-04
Epoch 581/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.6831e-04
Epoch 582/1000
1/1 [==============================] - 0s 12ms/step - loss: 5.6355e-04
Epoch 583/1000
1/1 [==============================] - 0s 4ms/step - loss: 5.5883e-04
Epoch 584/1000
1/1 [==============================] - 0s 3ms/step - loss: 5.5415e-04
Epoch 585/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.4950e-04
Epoch 586/1000
1/1 [==============================] - 0s 3ms/step - loss: 5.4490e-04
Epoch 587/1000
1/1 [==============================] - 0s 3ms/step - loss: 5.4033e-04
Epoch 588/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.3580e-04
Epoch 589/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 5.3131e-04
Epoch 590/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.2686e-04
Epoch 591/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.2244e-04
Epoch 592/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.1806e-04
Epoch 593/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.1372e-04
Epoch 594/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.0941e-04
Epoch 595/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.0514e-04
Epoch 596/1000
1/1 [==============================] - 0s 2ms/step - loss: 5.0091e-04
Epoch 597/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.9671e-04
Epoch 598/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.9255e-04
Epoch 599/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.8842e-04
Epoch 600/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.8433e-04
Epoch 601/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.8026e-04
Epoch 602/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.7624e-04
Epoch 603/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.7225e-04
Epoch 604/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.6829e-04
Epoch 605/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.6437e-04
Epoch 606/1000
1/1 [==============================] - 0s 1ms/step - loss: 4.6048e-04
Epoch 607/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.5662e-04
Epoch 608/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.5278e-04
Epoch 609/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.4899e-04
Epoch 610/1000
1/1 [==============================] - 0s 4ms/step - loss: 4.4523e-04
Epoch 611/1000
1/1 [==============================] - 0s 4ms/step - loss: 4.4150e-04
Epoch 612/1000
1/1 [==============================] - 0s 3ms/step - loss: 4.3780e-04
Epoch 613/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 4.3413e-04
Epoch 614/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.3049e-04
Epoch 615/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.2688e-04
Epoch 616/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.2330e-04
Epoch 617/1000
1/1 [==============================] - 0s 1ms/step - loss: 4.1975e-04
Epoch 618/1000
1/1 [==============================] - 0s 1ms/step - loss: 4.1624e-04
Epoch 619/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.1275e-04
Epoch 620/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.0929e-04
Epoch 621/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.0586e-04
Epoch 622/1000
1/1 [==============================] - 0s 1ms/step - loss: 4.0246e-04
Epoch 623/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.9908e-04
Epoch 624/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.9574e-04
Epoch 625/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.9242e-04
Epoch 626/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.8913e-04
Epoch 627/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.8587e-04
Epoch 628/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.8264e-04
Epoch 629/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.7943e-04
Epoch 630/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.7625e-04
Epoch 631/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.7310e-04
Epoch 632/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.6997e-04
Epoch 633/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.6687e-04
Epoch 634/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.6379e-04
Epoch 635/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.6075e-04
Epoch 636/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.5772e-04
Epoch 637/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 3.5472e-04
Epoch 638/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.5175e-04
Epoch 639/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.4880e-04
Epoch 640/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.4588e-04
Epoch 641/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.4298e-04
Epoch 642/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.4011e-04
Epoch 643/1000
1/1 [==============================] - 0s 3ms/step - loss: 3.3726e-04
Epoch 644/1000
1/1 [==============================] - 0s 4ms/step - loss: 3.3443e-04
Epoch 645/1000
1/1 [==============================] - 0s 3ms/step - loss: 3.3163e-04
Epoch 646/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.2885e-04
Epoch 647/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.2609e-04
Epoch 648/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.2336e-04
Epoch 649/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.2065e-04
Epoch 650/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.1796e-04
Epoch 651/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.1529e-04
Epoch 652/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.1265e-04
Epoch 653/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.1003e-04
Epoch 654/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.0743e-04
Epoch 655/1000
1/1 [==============================] - 0s 1ms/step - loss: 3.0486e-04
Epoch 656/1000
1/1 [==============================] - 0s 2ms/step - loss: 3.0230e-04
Epoch 657/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.9977e-04
Epoch 658/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.9726e-04
Epoch 659/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.9476e-04
Epoch 660/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.9229e-04
Epoch 661/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 2.8984e-04
Epoch 662/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.8741e-04
Epoch 663/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.8500e-04
Epoch 664/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.8261e-04
Epoch 665/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.8025e-04
Epoch 666/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.7790e-04
Epoch 667/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.7557e-04
Epoch 668/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.7326e-04
Epoch 669/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.7097e-04
Epoch 670/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.6870e-04
Epoch 671/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.6645e-04
Epoch 672/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.6421e-04
Epoch 673/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.6200e-04
Epoch 674/1000
1/1 [==============================] - 0s 3ms/step - loss: 2.5980e-04
Epoch 675/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.5763e-04
Epoch 676/1000
1/1 [==============================] - 0s 3ms/step - loss: 2.5546e-04
Epoch 677/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.5332e-04
Epoch 678/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.5120e-04
Epoch 679/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.4909e-04
Epoch 680/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.4701e-04
Epoch 681/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.4494e-04
Epoch 682/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.4288e-04
Epoch 683/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.4085e-04
Epoch 684/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.3883e-04
Epoch 685/1000
```

```
1/1 [==============================] - 0s 1ms/step - loss: 2.3683e-04
Epoch 686/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.3484e-04
Epoch 687/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.3287e-04
Epoch 688/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.3092e-04
Epoch 689/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.2899e-04
Epoch 690/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.2707e-04
Epoch 691/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.2516e-04
Epoch 692/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.2328e-04
Epoch 693/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.2141e-04
Epoch 694/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.1955e-04
Epoch 695/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.1771e-04
Epoch 696/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.1589e-04
Epoch 697/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.1408e-04
Epoch 698/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.1228e-04
Epoch 699/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.1050e-04
Epoch 700/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.0874e-04
Epoch 701/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.0699e-04
Epoch 702/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.0525e-04
Epoch 703/1000
1/1 [==============================] - 0s 2ms/step - loss: 2.0353e-04
Epoch 704/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.0183e-04
Epoch 705/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.0014e-04
Epoch 706/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.9846e-04
Epoch 707/1000
1/1 [==============================] - 0s 4ms/step - loss: 1.9680e-04
Epoch 708/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.9515e-04
Epoch 709/1000
```

```
1/1 [==============================] - 0s 3ms/step - loss: 1.9351e-04
Epoch 710/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.9189e-04
Epoch 711/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.9028e-04
Epoch 712/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.8869e-04
Epoch 713/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.8710e-04
Epoch 714/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.8554e-04
Epoch 715/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.8398e-04
Epoch 716/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.8244e-04
Epoch 717/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.8091e-04
Epoch 718/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.7940e-04
Epoch 719/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.7789e-04
Epoch 720/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.7640e-04
Epoch 721/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.7492e-04
Epoch 722/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.7345e-04
Epoch 723/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.7200e-04
Epoch 724/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.7056e-04
Epoch 725/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.6913e-04
Epoch 726/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.6771e-04
Epoch 727/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.6631e-04
Epoch 728/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.6491e-04
Epoch 729/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.6353e-04
Epoch 730/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.6216e-04
Epoch 731/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.6080e-04
Epoch 732/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.5945e-04
Epoch 733/1000
```

```
1/1 [==============================] - 0s 1ms/step - loss: 1.5811e-04
Epoch 734/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.5679e-04
Epoch 735/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.5548e-04
Epoch 736/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.5417e-04
Epoch 737/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.5288e-04
Epoch 738/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.5160e-04
Epoch 739/1000
1/1 [==============================] - 0s 11ms/step - loss: 1.5033e-04
Epoch 740/1000
1/1 [==============================] - 0s 5ms/step - loss: 1.4907e-04
Epoch 741/1000
1/1 [==============================] - 0s 4ms/step - loss: 1.4782e-04
Epoch 742/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.4658e-04
Epoch 743/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.4535e-04
Epoch 744/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.4413e-04
Epoch 745/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.4293e-04
Epoch 746/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.4173e-04
Epoch 747/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.4054e-04
Epoch 748/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3936e-04
Epoch 749/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.3820e-04
Epoch 750/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3704e-04
Epoch 751/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3589e-04
Epoch 752/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3475e-04
Epoch 753/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3362e-04
Epoch 754/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3250e-04
Epoch 755/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3139e-04
Epoch 756/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.3029e-04
Epoch 757/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 1.2920e-04
Epoch 758/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.2811e-04
Epoch 759/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.2704e-04
Epoch 760/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.2598e-04
Epoch 761/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.2492e-04
Epoch 762/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.2387e-04
Epoch 763/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.2283e-04
Epoch 764/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.2180e-04
Epoch 765/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.2078e-04
Epoch 766/1000
1/1 [==============================] - 0s 4ms/step - loss: 1.1977e-04
Epoch 767/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.1877e-04
Epoch 768/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.1777e-04
Epoch 769/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.1678e-04
Epoch 770/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.1581e-04
Epoch 771/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.1484e-04
Epoch 772/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.1387e-04
Epoch 773/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.1292e-04
Epoch 774/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.1197e-04
Epoch 775/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.1103e-04
Epoch 776/1000
1/1 [==============================] - 0s 3ms/step - loss: 1.1010e-04
Epoch 777/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.0918e-04
Epoch 778/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.0826e-04
Epoch 779/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.0736e-04
Epoch 780/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.0646e-04
Epoch 781/1000
```

```
1/1 [==============================] - 0s 2ms/step - loss: 1.0556e-04
Epoch 782/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.0468e-04
Epoch 783/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.0380e-04
Epoch 784/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.0293e-04
Epoch 785/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.0207e-04
Epoch 786/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.0121e-04
Epoch 787/1000
1/1 [==============================] - 0s 1ms/step - loss: 1.0037e-04
Epoch 788/1000
1/1 [==============================] - 0s 2ms/step - loss: 9.9525e-05
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1/1 [==============================] - 0s 2ms/step - loss: 9.8692e-05
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Epoch 804/1000
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Epoch 805/1000
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1/1 [==============================] - 0s 2ms/step - loss: 8.6259e-05
Epoch 806/1000
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Epoch 826/1000
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Epoch 827/1000
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Epoch 828/1000
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Epoch 829/1000
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1/1 [==============================] - 0s 3ms/step - loss: 7.0481e-05
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Epoch 849/1000
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Epoch 850/1000
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Epoch 851/1000
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1/1 [==============================] - 0s 2ms/step - loss: 5.7589e-05
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1/1 [==============================] - 0s 3ms/step - loss: 5.6628e-05
Epoch 856/1000
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Epoch 864/1000
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Epoch 865/1000
1/1 [==============================] - 0s 1ms/step - loss: 5.2057e-05
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Epoch 870/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.9912e-05
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Epoch 874/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.8259e-05
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1/1 [==============================] - 0s 2ms/step - loss: 4.7855e-05
Epoch 876/1000
1/1 [==============================] - 0s 2ms/step - loss: 4.7453e-05
Epoch 877/1000
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1/1 [==============================] - 0s 2ms/step - loss: 4.7056e-05
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Epoch 880/1000
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Epoch 881/1000
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Epoch 898/1000
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Epoch 899/1000
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Epoch 900/1000
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Epoch 901/1000
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1/1 [==============================] - 0s 1ms/step - loss: 3.8449e-05
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1/1 [==============================] - 0s 2ms/step - loss: 3.8127e-05
Epoch 903/1000
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Epoch 905/1000
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Epoch 906/1000
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Epoch 922/1000
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Epoch 923/1000
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Epoch 924/1000
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Epoch 925/1000
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Epoch 936/1000
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Epoch 937/1000
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Epoch 939/1000
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Epoch 946/1000
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Epoch 947/1000
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Epoch 948/1000
1/1 [==============================] - 0s 1ms/step - loss: 2.5886e-05
Epoch 949/1000
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1/1 [==============================] - 0s 1ms/step - loss: 2.5670e-05
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Epoch 951/1000
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Epoch 972/1000
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Epoch 997/1000
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1/1 [==============================] - 0s 2ms/step - loss: 1.6852e-05
Epoch 1000/1000
1/1 [==============================] - 0s 2ms/step - loss: 1.6711e-05
```

Now that your model has finished training it is time to test it out! You can do so by running the next cell.

[13]:
```
new_y = 7.0
prediction = model.predict([new_y])[0]
print(prediction)
```

[4.0000477]

If everything went as expected you should see a prediction value very close to 4. **If not, try adjusting your code before submitting the assignment.** Notice that you can play around with the value of `new_y` to get different predictions. In general you should see that the network was able to learn the linear relationship between `x` and `y`, so if you use a value of 8.0 you should get a prediction close to 4.5 and so on.

Congratulations on finishing this week's assignment!

You have successfully coded a neural network that learned the linear relationship between two variables. Nice job!

Keep it up!