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

So, imagine if house pricing was as easy as a house costs 50k + 50k per bedroom, so that a 1 bedroom house costs 100k, a 2 bedroom house costs 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.

In [14]:

```
import tensorflow as tf
import numpy as np
from tensorflow import keras
```

In [15]:

```
# GRADED FUNCTION: house_model
def house_model(y_new):
    xs = np.array([1.0,2.0,3.0,4.0,5.0,6.0,7.0,8.0,9.0,10.0],dtype=float) # Your Code Here#
    ys = np.array([1.0,1.5,2.0,2.5,3.0,3.5,4.0,4.5,5.0,5.5], dtype=float)# Your Code Here#
    model = tf.keras.Sequential([keras.layers.Dense(units=1, input_shape=[1])])
    model.compile(optimizer='sgd', loss='mean_squared_error')
    model.fit(xs, ys, epochs=500)
    return model.predict(y_new)[0]
```

In [16]:

```
prediction = house_model([7.0])
print(prediction,"hundred thousands")
```

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Epoch 1/500
10/10 [==============================] - 0s 28ms/sample - loss: 0.6435
Epoch 2/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0767
Epoch 3/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0503
Epoch 4/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0487
Epoch 5/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0482
Epoch 6/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0478
Epoch 7/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0474
Epoch 8/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0470
Epoch 9/500
10/10 [==============================] - 0s 155us/sample - loss: 0.0466
Epoch 10/500
10/10 [==============================] - 0s 158us/sample - loss: 0.0463
Epoch 11/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0459
Epoch 12/500
10/10 [==============================] - 0s 157us/sample - loss: 0.0455
Epoch 13/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0451
Epoch 14/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0447
Epoch 15/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0444
Epoch 16/500
10/10 [==============================] - 0s 180us/sample - loss: 0.0440
Epoch 17/500
10/10 [==============================] - 0s 176us/sample - loss: 0.0436
Epoch 18/500
10/10 [==============================] - 0s 189us/sample - loss: 0.0432
Epoch 19/500
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10/10 [==============================] - 0s 189us/sample - loss: 0.0429
Epoch 20/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0425
Epoch 21/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0422
Epoch 22/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0418
Epoch 23/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0415
Epoch 24/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0411
Epoch 25/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0408
Epoch 26/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0404
Epoch 27/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0401
Epoch 28/500
10/10 [==============================] - 0s 176us/sample - loss: 0.0398
Epoch 29/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0394
Epoch 30/500
10/10 [==============================] - 0s 173us/sample - loss: 0.0391
Epoch 31/500
10/10 [==============================] - 0s 180us/sample - loss: 0.0388
Epoch 32/500
10/10 [==============================] - 0s 182us/sample - loss: 0.0384
Epoch 33/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0381
Epoch 34/500
10/10 [==============================] - 0s 202us/sample - loss: 0.0378
Epoch 35/500
10/10 [==============================] - 0s 193us/sample - loss: 0.0375
Epoch 36/500
10/10 [==============================] - 0s 202us/sample - loss: 0.0372
Epoch 37/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0369
Epoch 38/500
10/10 [==============================] - 0s 198us/sample - loss: 0.0365
Epoch 39/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0362
Epoch 40/500
10/10 [==============================] - 0s 237us/sample - loss: 0.0359
Epoch 41/500
10/10 [==============================] - 0s 221us/sample - loss: 0.0356
Epoch 42/500
10/10 [==============================] - 0s 203us/sample - loss: 0.0353
Epoch 43/500
10/10 [==============================] - 0s 209us/sample - loss: 0.0350
Epoch 44/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0347
Epoch 45/500
10/10 [==============================] - 0s 239us/sample - loss: 0.0345
Epoch 46/500
10/10 [==============================] - 0s 211us/sample - loss: 0.0342
Epoch 47/500
10/10 [==============================] - 0s 176us/sample - loss: 0.0339
Epoch 48/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0336
Epoch 49/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0333
Epoch 50/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0330
Epoch 51/500
10/10 [==============================] - 0s 193us/sample - loss: 0.0328
Epoch 52/500
10/10 [==============================] - 0s 208us/sample - loss: 0.0325
Epoch 53/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0322
Epoch 54/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0319
Epoch 55/500
10/10 [==============================] - 0s 188us/sample - loss: 0.0317
Epoch 56/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0314
Epoch 57/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0311
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Epoch 58/500
10/10 [==============================] - 0s 200us/sample - loss: 0.0309
Epoch 59/500
10/10 [==============================] - 0s 192us/sample - loss: 0.0306
Epoch 60/500
10/10 [==============================] - 0s 166us/sample - loss: 0.0304
Epoch 61/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0301
Epoch 62/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0299
Epoch 63/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0296
Epoch 64/500
10/10 [==============================] - 0s 157us/sample - loss: 0.0294
Epoch 65/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0291
Epoch 66/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0289
Epoch 67/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0286
Epoch 68/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0284
Epoch 69/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0282
Epoch 70/500
10/10 [==============================] - 0s 206us/sample - loss: 0.0279
Epoch 71/500
10/10 [==============================] - 0s 158us/sample - loss: 0.0277
Epoch 72/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0275
Epoch 73/500
10/10 [==============================] - 0s 205us/sample - loss: 0.0272
Epoch 74/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0270
Epoch 75/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0268
Epoch 76/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0265
Epoch 77/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0263
Epoch 78/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0261
Epoch 79/500
10/10 [==============================] - 0s 163us/sample - loss: 0.0259
Epoch 80/500
10/10 [==============================] - 0s 189us/sample - loss: 0.0257
Epoch 81/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0254
Epoch 82/500
10/10 [==============================] - 0s 230us/sample - loss: 0.0252
Epoch 83/500
10/10 [==============================] - 0s 220us/sample - loss: 0.0250
Epoch 84/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0248
Epoch 85/500
10/10 [==============================] - 0s 184us/sample - loss: 0.0246
Epoch 86/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0244
Epoch 87/500
10/10 [==============================] - 0s 157us/sample - loss: 0.0242
Epoch 88/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0240
Epoch 89/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0238
Epoch 90/500
10/10 [==============================] - 0s 180us/sample - loss: 0.0236
Epoch 91/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0234
Epoch 92/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0232
Epoch 93/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0230
Epoch 94/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0228
Epoch 95/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0226
Epoch 96/500
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10/10 [==============================] - 0s 178us/sample - loss: 0.0224
Epoch 97/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0222
Epoch 98/500
10/10 [==============================] - 0s 163us/sample - loss: 0.0221
Epoch 99/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0219
Epoch 100/500
10/10 [==============================] - 0s 205us/sample - loss: 0.0217
Epoch 101/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0215
Epoch 102/500
10/10 [==============================] - 0s 218us/sample - loss: 0.0213
Epoch 103/500
10/10 [==============================] - 0s 224us/sample - loss: 0.0211
Epoch 104/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0210
Epoch 105/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0208
Epoch 106/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0206
Epoch 107/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0204
Epoch 108/500
10/10 [==============================] - 0s 200us/sample - loss: 0.0203
Epoch 109/500
10/10 [==============================] - 0s 196us/sample - loss: 0.0201
Epoch 110/500
10/10 [==============================] - 0s 199us/sample - loss: 0.0199
Epoch 111/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0198
Epoch 112/500
10/10 [==============================] - 0s 197us/sample - loss: 0.0196
Epoch 113/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0194
Epoch 114/500
10/10 [==============================] - 0s 158us/sample - loss: 0.0193
Epoch 115/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0191
Epoch 116/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0190
Epoch 117/500
10/10 [==============================] - 0s 151us/sample - loss: 0.0188
Epoch 118/500
10/10 [==============================] - 0s 149us/sample - loss: 0.0186
Epoch 119/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0185
Epoch 120/500
10/10 [==============================] - 0s 209us/sample - loss: 0.0183
Epoch 121/500
10/10 [==============================] - 0s 205us/sample - loss: 0.0182
Epoch 122/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0180
Epoch 123/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0179
Epoch 124/500
10/10 [==============================] - 0s 210us/sample - loss: 0.0177
Epoch 125/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0176
Epoch 126/500
10/10 [==============================] - 0s 199us/sample - loss: 0.0174
Epoch 127/500
10/10 [==============================] - 0s 195us/sample - loss: 0.0173
Epoch 128/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0171
Epoch 129/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0170
Epoch 130/500
10/10 [==============================] - 0s 199us/sample - loss: 0.0168
Epoch 131/500
10/10 [==============================] - 0s 208us/sample - loss: 0.0167
Epoch 132/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0166
Epoch 133/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0164
Epoch 134/500
10/10 [==============================] - 0s 271us/sample - loss: 0.0163
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Epoch 135/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0162
Epoch 136/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0160
Epoch 137/500
10/10 [==============================] - 0s 192us/sample - loss: 0.0159
Epoch 138/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0158
Epoch 139/500
10/10 [==============================] - 0s 213us/sample - loss: 0.0156
Epoch 140/500
10/10 [==============================] - 0s 199us/sample - loss: 0.0155
Epoch 141/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0154
Epoch 142/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0152
Epoch 143/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0151
Epoch 144/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0150
Epoch 145/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0148
Epoch 146/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0147
Epoch 147/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0146
Epoch 148/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0145
Epoch 149/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0144
Epoch 150/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0142
Epoch 151/500
10/10 [==============================] - 0s 179us/sample - loss: 0.0141
Epoch 152/500
10/10 [==============================] - 0s 236us/sample - loss: 0.0140
Epoch 153/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0139
Epoch 154/500
10/10 [==============================] - 0s 236us/sample - loss: 0.0138
Epoch 155/500
10/10 [==============================] - 0s 207us/sample - loss: 0.0137
Epoch 156/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0135
Epoch 157/500
10/10 [==============================] - 0s 142us/sample - loss: 0.0134
Epoch 158/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0133
Epoch 159/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0132
Epoch 160/500
10/10 [==============================] - 0s 180us/sample - loss: 0.0131
Epoch 161/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0130
Epoch 162/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0129
Epoch 163/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0128
Epoch 164/500
10/10 [==============================] - 0s 162us/sample - loss: 0.0127
Epoch 165/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0125
Epoch 166/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0124
Epoch 167/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0123
Epoch 168/500
10/10 [==============================] - 0s 173us/sample - loss: 0.0122
Epoch 169/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0121
Epoch 170/500
10/10 [==============================] - 0s 192us/sample - loss: 0.0120
Epoch 171/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0119
Epoch 172/500
10/10 [==============================] - 0s 243us/sample - loss: 0.0118
Epoch 173/500
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10/10 [==============================] - 0s 198us/sample - loss: 0.0117
Epoch 174/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0116
Epoch 175/500
10/10 [==============================] - 0s 182us/sample - loss: 0.0115
Epoch 176/500
10/10 [==============================] - 0s 231us/sample - loss: 0.0114
Epoch 177/500
10/10 [==============================] - 0s 205us/sample - loss: 0.0113
Epoch 178/500
10/10 [==============================] - 0s 172us/sample - loss: 0.0112
Epoch 179/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0112
Epoch 180/500
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Epoch 181/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0110
Epoch 182/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0109
Epoch 183/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0108
Epoch 184/500
10/10 [==============================] - 0s 176us/sample - loss: 0.0107
Epoch 185/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0106
Epoch 186/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0105
Epoch 187/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0104
Epoch 188/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0103
Epoch 189/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0103
Epoch 190/500
10/10 [==============================] - 0s 212us/sample - loss: 0.0102
Epoch 191/500
10/10 [==============================] - 0s 189us/sample - loss: 0.0101
Epoch 192/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0100
Epoch 193/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0099
Epoch 194/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0098
Epoch 195/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0097
Epoch 196/500
10/10 [==============================] - 0s 228us/sample - loss: 0.0097
Epoch 197/500
10/10 [==============================] - 0s 208us/sample - loss: 0.0096
Epoch 198/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0095
Epoch 199/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0094
Epoch 200/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0093
Epoch 201/500
10/10 [==============================] - 0s 217us/sample - loss: 0.0093
Epoch 202/500
10/10 [==============================] - 0s 203us/sample - loss: 0.0092
Epoch 203/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0091
Epoch 204/500
10/10 [==============================] - 0s 230us/sample - loss: 0.0090
Epoch 205/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0090
Epoch 206/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0089
Epoch 207/500
10/10 [==============================] - 0s 172us/sample - loss: 0.0088
Epoch 208/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0087
Epoch 209/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0087
Epoch 210/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0086
Epoch 211/500
10/10 [==============================] - 0s 176us/sample - loss: 0.0085
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Epoch 212/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0084
Epoch 213/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0084
Epoch 214/500
10/10 [==============================] - 0s 157us/sample - loss: 0.0083
Epoch 215/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0082
Epoch 216/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0082
Epoch 217/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0081
Epoch 218/500
10/10 [==============================] - 0s 179us/sample - loss: 0.0080
Epoch 219/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0080
Epoch 220/500
10/10 [==============================] - 0s 199us/sample - loss: 0.0079
Epoch 221/500
10/10 [==============================] - 0s 184us/sample - loss: 0.0078
Epoch 222/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0078
Epoch 223/500
10/10 [==============================] - 0s 197us/sample - loss: 0.0077
Epoch 224/500
10/10 [==============================] - 0s 173us/sample - loss: 0.0076
Epoch 225/500
10/10 [==============================] - 0s 196us/sample - loss: 0.0076
Epoch 226/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0075
Epoch 227/500
10/10 [==============================] - 0s 212us/sample - loss: 0.0074
Epoch 228/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0074
Epoch 229/500
10/10 [==============================] - 0s 184us/sample - loss: 0.0073
Epoch 230/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0073
Epoch 231/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0072
Epoch 232/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0071
Epoch 233/500
10/10 [==============================] - 0s 195us/sample - loss: 0.0071
Epoch 234/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0070
Epoch 235/500
10/10 [==============================] - 0s 208us/sample - loss: 0.0070
Epoch 236/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0069
Epoch 237/500
10/10 [==============================] - 0s 172us/sample - loss: 0.0068
Epoch 238/500
10/10 [==============================] - 0s 228us/sample - loss: 0.0068
Epoch 239/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0067
Epoch 240/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0067
Epoch 241/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0066
Epoch 242/500
10/10 [==============================] - 0s 173us/sample - loss: 0.0066
Epoch 243/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0065
Epoch 244/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0065
Epoch 245/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0064
Epoch 246/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0063
Epoch 247/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0063
Epoch 248/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0062
Epoch 249/500
10/10 [==============================] - 0s 182us/sample - loss: 0.0062
Epoch 250/500
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10/10 [==============================] - 0s 179us/sample - loss: 0.0061
Epoch 251/500
10/10 [==============================] - 0s 182us/sample - loss: 0.0061
Epoch 252/500
10/10 [==============================] - 0s 188us/sample - loss: 0.0060
Epoch 253/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0060
Epoch 254/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0059
Epoch 255/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0059
Epoch 256/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0058
Epoch 257/500
10/10 [==============================] - 0s 184us/sample - loss: 0.0058
Epoch 258/500
10/10 [==============================] - 0s 176us/sample - loss: 0.0057
Epoch 259/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0057
Epoch 260/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0056
Epoch 261/500
10/10 [==============================] - 0s 200us/sample - loss: 0.0056
Epoch 262/500
10/10 [==============================] - 0s 216us/sample - loss: 0.0055
Epoch 263/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0055
Epoch 264/500
10/10 [==============================] - 0s 166us/sample - loss: 0.0055
Epoch 265/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0054
Epoch 266/500
10/10 [==============================] - 0s 158us/sample - loss: 0.0054
Epoch 267/500
10/10 [==============================] - 0s 217us/sample - loss: 0.0053
Epoch 268/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0053
Epoch 269/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0052
Epoch 270/500
10/10 [==============================] - 0s 207us/sample - loss: 0.0052
Epoch 271/500
10/10 [==============================] - 0s 172us/sample - loss: 0.0051
Epoch 272/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0051
Epoch 273/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0051
Epoch 274/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0050
Epoch 275/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0050
Epoch 276/500
10/10 [==============================] - 0s 232us/sample - loss: 0.0049
Epoch 277/500
10/10 [==============================] - 0s 152us/sample - loss: 0.0049
Epoch 278/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0048
Epoch 279/500
10/10 [==============================] - 0s 193us/sample - loss: 0.0048
Epoch 280/500
10/10 [==============================] - 0s 150us/sample - loss: 0.0048
Epoch 281/500
10/10 [==============================] - 0s 162us/sample - loss: 0.0047
Epoch 282/500
10/10 [==============================] - 0s 146us/sample - loss: 0.0047
Epoch 283/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0046
Epoch 284/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0046
Epoch 285/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0046
Epoch 286/500
10/10 [==============================] - 0s 158us/sample - loss: 0.0045
Epoch 287/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0045
Epoch 288/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0045
```

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Epoch 289/500
10/10 [==============================] - 0s 188us/sample - loss: 0.0044
Epoch 290/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0044
Epoch 291/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0043
Epoch 292/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0043
Epoch 293/500
10/10 [==============================] - 0s 200us/sample - loss: 0.0043
Epoch 294/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0042
Epoch 295/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0042
Epoch 296/500
10/10 [==============================] - 0s 186us/sample - loss: 0.0042
Epoch 297/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0041
Epoch 298/500
10/10 [==============================] - 0s 210us/sample - loss: 0.0041
Epoch 299/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0041
Epoch 300/500
10/10 [==============================] - 0s 163us/sample - loss: 0.0040
Epoch 301/500
10/10 [==============================] - 0s 157us/sample - loss: 0.0040
Epoch 302/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0040
Epoch 303/500
10/10 [==============================] - 0s 163us/sample - loss: 0.0039
Epoch 304/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0039
Epoch 305/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0039
Epoch 306/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0038
Epoch 307/500
10/10 [==============================] - 0s 205us/sample - loss: 0.0038
Epoch 308/500
10/10 [==============================] - 0s 184us/sample - loss: 0.0038
Epoch 309/500
10/10 [==============================] - 0s 162us/sample - loss: 0.0037
Epoch 310/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0037
Epoch 311/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0037
Epoch 312/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0036
Epoch 313/500
10/10 [==============================] - 0s 198us/sample - loss: 0.0036
Epoch 314/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0036
Epoch 315/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0036
Epoch 316/500
10/10 [==============================] - 0s 192us/sample - loss: 0.0035
Epoch 317/500
10/10 [==============================] - 0s 155us/sample - loss: 0.0035
Epoch 318/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0035
Epoch 319/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0034
Epoch 320/500
10/10 [==============================] - 0s 248us/sample - loss: 0.0034
Epoch 321/500
10/10 [==============================] - 0s 233us/sample - loss: 0.0034
Epoch 322/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0033
Epoch 323/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0033
Epoch 324/500
10/10 [==============================] - 0s 186us/sample - loss: 0.0033
Epoch 325/500
10/10 [==============================] - 0s 154us/sample - loss: 0.0033
Epoch 326/500
10/10 [==============================] - 0s 205us/sample - loss: 0.0032
Epoch 327/500
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10/10 [==============================] - 0s 221us/sample - loss: 0.0032
Epoch 328/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0032
Epoch 329/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0032
Epoch 330/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0031
Epoch 331/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0031
Epoch 332/500
10/10 [==============================] - 0s 156us/sample - loss: 0.0031
Epoch 333/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0031
Epoch 334/500
10/10 [==============================] - 0s 203us/sample - loss: 0.0030
Epoch 335/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0030
Epoch 336/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0030
Epoch 337/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0030
Epoch 338/500
10/10 [==============================] - 0s 171us/sample - loss: 0.0029
Epoch 339/500
10/10 [==============================] - 0s 189us/sample - loss: 0.0029
Epoch 340/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0029
Epoch 341/500
10/10 [==============================] - 0s 206us/sample - loss: 0.0029
Epoch 342/500
10/10 [==============================] - 0s 182us/sample - loss: 0.0028
Epoch 343/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0028
Epoch 344/500
10/10 [==============================] - 0s 173us/sample - loss: 0.0028
Epoch 345/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0028
Epoch 346/500
10/10 [==============================] - 0s 224us/sample - loss: 0.0027
Epoch 347/500
10/10 [==============================] - 0s 230us/sample - loss: 0.0027
Epoch 348/500
10/10 [==============================] - 0s 216us/sample - loss: 0.0027
Epoch 349/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0027
Epoch 350/500
10/10 [==============================] - 0s 190us/sample - loss: 0.0026
Epoch 351/500
10/10 [==============================] - 0s 208us/sample - loss: 0.0026
Epoch 352/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0026
Epoch 353/500
10/10 [==============================] - 0s 177us/sample - loss: 0.0026
Epoch 354/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0026
Epoch 355/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0025
Epoch 356/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0025
Epoch 357/500
10/10 [==============================] - 0s 188us/sample - loss: 0.0025
Epoch 358/500
10/10 [==============================] - 0s 180us/sample - loss: 0.0025
Epoch 359/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0025
Epoch 360/500
10/10 [==============================] - 0s 167us/sample - loss: 0.0024
Epoch 361/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0024
Epoch 362/500
10/10 [==============================] - 0s 173us/sample - loss: 0.0024
Epoch 363/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0024
Epoch 364/500
10/10 [==============================] - 0s 179us/sample - loss: 0.0024
Epoch 365/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0023
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Epoch 366/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0023
Epoch 367/500
10/10 [==============================] - 0s 211us/sample - loss: 0.0023
Epoch 368/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0023
Epoch 369/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0023
Epoch 370/500
10/10 [==============================] - 0s 215us/sample - loss: 0.0022
Epoch 371/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0022
Epoch 372/500
10/10 [==============================] - 0s 207us/sample - loss: 0.0022
Epoch 373/500
10/10 [==============================] - 0s 152us/sample - loss: 0.0022
Epoch 374/500
10/10 [==============================] - 0s 193us/sample - loss: 0.0022
Epoch 375/500
10/10 [==============================] - 0s 195us/sample - loss: 0.0021
Epoch 376/500
10/10 [==============================] - 0s 151us/sample - loss: 0.0021
Epoch 377/500
10/10 [==============================] - 0s 149us/sample - loss: 0.0021
Epoch 378/500
10/10 [==============================] - 0s 150us/sample - loss: 0.0021
Epoch 379/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0021
Epoch 380/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0021
Epoch 381/500
10/10 [==============================] - 0s 165us/sample - loss: 0.0020
Epoch 382/500
10/10 [==============================] - 0s 197us/sample - loss: 0.0020
Epoch 383/500
10/10 [==============================] - 0s 162us/sample - loss: 0.0020
Epoch 384/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0020
Epoch 385/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0020
Epoch 386/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0020
Epoch 387/500
10/10 [==============================] - 0s 179us/sample - loss: 0.0019
Epoch 388/500
10/10 [==============================] - 0s 198us/sample - loss: 0.0019
Epoch 389/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0019
Epoch 390/500
10/10 [==============================] - 0s 191us/sample - loss: 0.0019
Epoch 391/500
10/10 [==============================] - 0s 218us/sample - loss: 0.0019
Epoch 392/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0019
Epoch 393/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0018
Epoch 394/500
10/10 [==============================] - 0s 196us/sample - loss: 0.0018
Epoch 395/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0018
Epoch 396/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0018
Epoch 397/500
10/10 [==============================] - 0s 179us/sample - loss: 0.0018
Epoch 398/500
10/10 [==============================] - 0s 189us/sample - loss: 0.0018
Epoch 399/500
10/10 [==============================] - 0s 187us/sample - loss: 0.0018
Epoch 400/500
10/10 [==============================] - 0s 226us/sample - loss: 0.0017
Epoch 401/500
10/10 [==============================] - 0s 151us/sample - loss: 0.0017
Epoch 402/500
10/10 [==============================] - 0s 213us/sample - loss: 0.0017
Epoch 403/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0017
Epoch 404/500
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Epoch 404/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0017
Epoch 405/500
10/10 [==============================] - 0s 164us/sample - loss: 0.0017
Epoch 406/500
10/10 [==============================] - 0s 180us/sample - loss: 0.0017
Epoch 407/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0016
Epoch 408/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0016
Epoch 409/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0016
Epoch 410/500
10/10 [==============================] - 0s 166us/sample - loss: 0.0016
Epoch 411/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0016
Epoch 412/500
10/10 [==============================] - 0s 220us/sample - loss: 0.0016
Epoch 413/500
10/10 [==============================] - 0s 172us/sample - loss: 0.0016
Epoch 414/500
10/10 [==============================] - 0s 181us/sample - loss: 0.0015
Epoch 415/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0015
Epoch 416/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0015
Epoch 417/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0015
Epoch 418/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0015
Epoch 419/500
10/10 [==============================] - 0s 157us/sample - loss: 0.0015
Epoch 420/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0015
Epoch 421/500
10/10 [==============================] - 0s 183us/sample - loss: 0.0015
Epoch 422/500
10/10 [==============================] - 0s 175us/sample - loss: 0.0014
Epoch 423/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0014
Epoch 424/500
10/10 [==============================] - 0s 201us/sample - loss: 0.0014
Epoch 425/500
10/10 [==============================] - 0s 178us/sample - loss: 0.0014
Epoch 426/500
10/10 [==============================] - 0s 169us/sample - loss: 0.0014
Epoch 427/500
10/10 [==============================] - 0s 166us/sample - loss: 0.0014
Epoch 428/500
10/10 [==============================] - 0s 189us/sample - loss: 0.0014
Epoch 429/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0014
Epoch 430/500
10/10 [==============================] - 0s 308us/sample - loss: 0.0013
Epoch 431/500
10/10 [==============================] - 0s 218us/sample - loss: 0.0013
Epoch 432/500
10/10 [==============================] - 0s 161us/sample - loss: 0.0013
Epoch 433/500
10/10 [==============================] - 0s 166us/sample - loss: 0.0013
Epoch 434/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0013
Epoch 435/500
10/10 [==============================] - 0s 221us/sample - loss: 0.0013
Epoch 436/500
10/10 [==============================] - 0s 216us/sample - loss: 0.0013
Epoch 437/500
10/10 [==============================] - 0s 207us/sample - loss: 0.0013
Epoch 438/500
10/10 [==============================] - 0s 231us/sample - loss: 0.0013
Epoch 439/500
10/10 [==============================] - 0s 211us/sample - loss: 0.0013
Epoch 440/500
10/10 [==============================] - 0s 231us/sample - loss: 0.0012
Epoch 441/500
10/10 [==============================] - 0s 194us/sample - loss: 0.0012
Epoch 442/500
10/10 [==============================] - 0s 217us/sample - loss: 0.0012
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10/10 [==============================] - 0s 217us/sample - loss: 0.0012
Epoch 443/500
10/10 [==============================] - 0s 199us/sample - loss: 0.0012
Epoch 444/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0012
Epoch 445/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0012
Epoch 446/500
10/10 [==============================] - 0s 191us/sample - loss: 0.0012
Epoch 447/500
10/10 [==============================] - 0s 198us/sample - loss: 0.0012
Epoch 448/500
10/10 [==============================] - 0s 159us/sample - loss: 0.0012
Epoch 449/500
10/10 [==============================] - 0s 217us/sample - loss: 0.0011
Epoch 450/500
10/10 [==============================] - 0s 188us/sample - loss: 0.0011
Epoch 451/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0011
Epoch 452/500
10/10 [==============================] - 0s 203us/sample - loss: 0.0011
Epoch 453/500
10/10 [==============================] - 0s 155us/sample - loss: 0.0011
Epoch 454/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0011
Epoch 455/500
10/10 [==============================] - 0s 185us/sample - loss: 0.0011
Epoch 456/500
10/10 [==============================] - 0s 212us/sample - loss: 0.0011
Epoch 457/500
10/10 [==============================] - 0s 8ms/sample - loss: 0.0011
Epoch 458/500
10/10 [==============================] - 0s 168us/sample - loss: 0.0011
Epoch 459/500
10/10 [==============================] - 0s 174us/sample - loss: 0.0011
Epoch 460/500
10/10 [==============================] - 0s 172us/sample - loss: 0.0010
Epoch 461/500
10/10 [==============================] - 0s 160us/sample - loss: 0.0010
Epoch 462/500
10/10 [==============================] - 0s 170us/sample - loss: 0.0010
Epoch 463/500
10/10 [==============================] - 0s 9ms/sample - loss: 0.0010
Epoch 464/500
10/10 [==============================] - 0s 225us/sample - loss: 0.0010
Epoch 465/500
10/10 [==============================] - 0s 202us/sample - loss: 0.0010
Epoch 466/500
10/10 [==============================] - 0s 178us/sample - loss: 9.9619e-04
Epoch 467/500
10/10 [==============================] - 0s 195us/sample - loss: 9.8784e-04
Epoch 468/500
10/10 [==============================] - 0s 220us/sample - loss: 9.7956e-04
Epoch 469/500
10/10 [==============================] - 0s 171us/sample - loss: 9.7135e-04
Epoch 470/500
10/10 [==============================] - 0s 182us/sample - loss: 9.6321e-04
Epoch 471/500
10/10 [==============================] - 0s 174us/sample - loss: 9.5514e-04
Epoch 472/500
10/10 [==============================] - 0s 164us/sample - loss: 9.4713e-04
Epoch 473/500
10/10 [==============================] - 0s 191us/sample - loss: 9.3919e-04
Epoch 474/500
10/10 [==============================] - 0s 199us/sample - loss: 9.3132e-04
Epoch 475/500
10/10 [==============================] - 0s 181us/sample - loss: 9.2352e-04
Epoch 476/500
10/10 [==============================] - 0s 189us/sample - loss: 9.1578e-04
Epoch 477/500
10/10 [==============================] - 0s 192us/sample - loss: 9.0810e-04
Epoch 478/500
10/10 [==============================] - 0s 188us/sample - loss: 9.0049e-04
Epoch 479/500
10/10 [==============================] - 0s 185us/sample - loss: 8.9294e-04
Epoch 480/500
10/10 [==============================] - 0s 193us/sample - loss: 8.8546e-04
Epoch 481/500
```

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Epoch 481/500
10/10 [==============================] - 0s 8ms/sample - loss: 8.7803e-04
Epoch 482/500
10/10 [==============================] - 0s 201us/sample - loss: 8.7067e-04
Epoch 483/500
10/10 [==============================] - 0s 207us/sample - loss: 8.6338e-04
Epoch 484/500
10/10 [==============================] - 0s 228us/sample - loss: 8.5614e-04
Epoch 485/500
10/10 [==============================] - 0s 203us/sample - loss: 8.4897e-04
Epoch 486/500
10/10 [==============================] - 0s 203us/sample - loss: 8.4185e-04
Epoch 487/500
10/10 [==============================] - 0s 8ms/sample - loss: 8.3479e-04
Epoch 488/500
10/10 [==============================] - 0s 205us/sample - loss: 8.2780e-04
Epoch 489/500
10/10 [==============================] - 0s 222us/sample - loss: 8.2086e-04
Epoch 490/500
10/10 [==============================] - 0s 201us/sample - loss: 8.1398e-04
Epoch 491/500
10/10 [==============================] - 0s 218us/sample - loss: 8.0716e-04
Epoch 492/500
10/10 [==============================] - 0s 185us/sample - loss: 8.0039e-04
Epoch 493/500
10/10 [==============================] - 0s 209us/sample - loss: 7.9368e-04
Epoch 494/500
10/10 [==============================] - 0s 199us/sample - loss: 7.8703e-04
Epoch 495/500
10/10 [==============================] - 0s 251us/sample - loss: 7.8043e-04
Epoch 496/500
10/10 [==============================] - 0s 225us/sample - loss: 7.7389e-04
Epoch 497/500
10/10 [==============================] - 0s 181us/sample - loss: 7.6741e-04
Epoch 498/500
10/10 [==============================] - 0s 185us/sample - loss: 7.6098e-04
Epoch 499/500
10/10 [==============================] - 0s 181us/sample - loss: 7.5460e-04
Epoch 500/500
10/10 [==============================] - 0s 199us/sample - loss: 7.4828e-04
[4.000323] hundred thousands
```

In [4]:

```
# Now click the 'Submit Assignment' button above.
# Once that is complete, please run the following two cells to save your work and close the notebo
ok
```

In [ ]:

```
%%javascript
<!-- Save the notebook -->
IPython.notebook.save_checkpoint();
```

In [ ]:

```
%%javascript
<!-- Shutdown and close the notebook -->
window.onbeforeunload = null
window.close();
IPython.notebook.session.delete();
```