Importing Libraries

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Importing Dataset

In [2]:
```
df=pd.read_csv("50_Startups.csv")
df
```

Out[2]:

	R&D Spend	Administration	Marketing Spend	State	Profit
0	165349.20	136897.80	471784.10	New York	192261.83
1	162597.70	151377.59	443898.53	California	191792.06
2	153441.51	101145.55	407934.54	Florida	191050.39
3	144372.41	118671.85	383199.62	New York	182901.99
4	142107.34	91391.77	366168.42	Florida	166187.94
5	131876.90	99814.71	362861.36	New York	156991.12
6	134615.46	147198.87	127716.82	California	156122.51
7	130298.13	145530.06	323876.68	Florida	155752.60
8	120542.52	148718.95	311613.29	New York	152211.77
9	123334.88	108679.17	304981.62	California	149759.96
10	101913.08	110594.11	229160.95	Florida	146121.95
11	100671.96	91790.61	249744.55	California	144259.40
12	93863.75	127320.38	249839.44	Florida	141585.52
13	91992.39	135495.07	252664.93	California	134307.35
14	119943.24	156547.42	256512.92	Florida	132602.65
15	114523.61	122616.84	261776.23	New York	129917.04
16	78013.11	121597.55	264346.06	California	126992.93
17	94657.16	145077.58	282574.31	New York	125370.37
18	91749.16	114175.79	294919.57	Florida	124266.90
19	86419.70	153514.11	0.00	New York	122776.86
20	76253.86	113867.30	298664.47	California	118474.03
21	78389.47	153773.43	299737.29	New York	111313.02
22	73994.56	122782.75	303319.26	Florida	110352.25
23	67532.53	105751.03	304768.73	Florida	108733.99
24	77044.01	99281.34	140574.81	New York	108552.04
25	64664.71	139553.16	137962.62	California	107404.34
26	75328.87	144135.98	134050.07	Florida	105733.54
27	72107.60	127864.55	353183.81	New York	105008.31
28	66051.52	182645.56	118148.20	Florida	103282.38
29	65605.48	153032.06	107138.38	New York	101004.64
30	61994.48	115641.28	91131.24	Florida	99937.59
31	61136.38	152701.92	88218.23	New York	97483.56
32	63408.86	129219.61	46085.25	California	97427.84
33	55493.95	103057.49	214634.81	Florida	96778.92

	R&D Spend	Administration	Marketing Spend	State	Profit
34	46426.07	157693.92	210797.67	California	96712.80
35	46014.02	85047.44	205517.64	New York	96479.51
36	28663.76	127056.21	201126.82	Florida	90708.19
37	44069.95	51283.14	197029.42	California	89949.14
38	20229.59	65947.93	185265.10	New York	81229.06
39	38558.51	82982.09	174999.30	California	81005.76
40	28754.33	118546.05	172795.67	California	78239.91
41	27892.92	84710.77	164470.71	Florida	77798.83
42	23640.93	96189.63	148001.11	California	71498.49
43	15505.73	127382.30	35534.17	New York	69758.98
44	22177.74	154806.14	28334.72	California	65200.33
45	1000.23	124153.04	1903.93	New York	64926.08
46	1315.46	115816.21	297114.46	Florida	49490.75
47	0.00	135426.92	0.00	California	42559.73
48	542.05	51743.15	0.00	New York	35673.41
49	0.00	116983.80	45173.06	California	14681.40

In [3]:
```
df.columns=['RD_Spend',"Administration",'Marketing_Spend','State','Profit']
df
```

Out[3]:

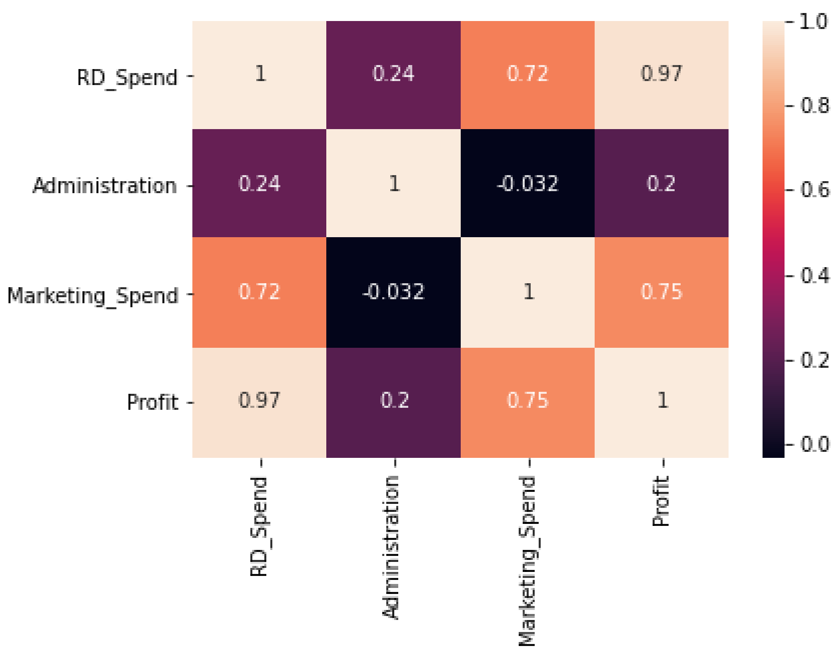
	RD_Spend	Administration	Marketing_Spend	State	Profit
0	165349.20	136897.80	471784.10	New York	192261.83
1	162597.70	151377.59	443898.53	California	191792.06
2	153441.51	101145.55	407934.54	Florida	191050.39
3	144372.41	118671.85	383199.62	New York	182901.99
4	142107.34	91391.77	366168.42	Florida	166187.94
5	131876.90	99814.71	362861.36	New York	156991.12
6	134615.46	147198.87	127716.82	California	156122.51
7	130298.13	145530.06	323876.68	Florida	155752.60
8	120542.52	148718.95	311613.29	New York	152211.77
9	123334.88	108679.17	304981.62	California	149759.96
10	101913.08	110594.11	229160.95	Florida	146121.95
11	100671.96	91790.61	249744.55	California	144259.40
12	93863.75	127320.38	249839.44	Florida	141585.52
13	91992.39	135495.07	252664.93	California	134307.35
14	119943.24	156547.42	256512.92	Florida	132602.65
15	114523.61	122616.84	261776.23	New York	129917.04
16	78013.11	121597.55	264346.06	California	126992.93
17	94657.16	145077.58	282574.31	New York	125370.37
18	91749.16	114175.79	294919.57	Florida	124266.90
19	86419.70	153514.11	0.00	New York	122776.86
20	76253.86	113867.30	298664.47	California	118474.03
21	78389.47	153773.43	299737.29	New York	111313.02
22	73994.56	122782.75	303319.26	Florida	110352.25
23	67532.53	105751.03	304768.73	Florida	108733.99
24	77044.01	99281.34	140574.81	New York	108552.04
25	64664.71	139553.16	137962.62	California	107404.34
26	75328.87	144135.98	134050.07	Florida	105733.54
27	72107.60	127864.55	353183.81	New York	105008.31
28	66051.52	182645.56	118148.20	Florida	103282.38
29	65605.48	153032.06	107138.38	New York	101004.64
30	61994.48	115641.28	91131.24	Florida	99937.59
31	61136.38	152701.92	88218.23	New York	97483.56
32	63408.86	129219.61	46085.25	California	97427.84
33	55493.95	103057.49	214634.81	Florida	96778.92

	RD_Spend	Administration	Marketing_Spend	State	Profit
34	46426.07	157693.92	210797.67	California	96712.80
35	46014.02	85047.44	205517.64	New York	96479.51
36	28663.76	127056.21	201126.82	Florida	90708.19
37	44069.95	51283.14	197029.42	California	89949.14
38	20229.59	65947.93	185265.10	New York	81229.06
39	38558.51	82982.09	174999.30	California	81005.76
40	28754.33	118546.05	172795.67	California	78239.91
41	27892.92	84710.77	164470.71	Florida	77798.83
42	23640.93	96189.63	148001.11	California	71498.49
43	15505.73	127382.30	35534.17	New York	69758.98
44	22177.74	154806.14	28334.72	California	65200.33
45	1000.23	124153.04	1903.93	New York	64926.08
46	1315.46	115816.21	297114.46	Florida	49490.75
47	0.00	135426.92	0.00	California	42559.73
48	542.05	51743.15	0.00	New York	35673.41
49	0.00	116983.80	45173.06	California	14681.40

In [4]:

```
sns.heatmap(df.corr(),annot=True)
```

Out[4]: <AxesSubplot:>



In [5]:
```
x=df.iloc[:,0:4]
x
```

Out[5]:

	RD_Spend	Administration	Marketing_Spend	State
0	165349.20	136897.80	471784.10	New York
1	162597.70	151377.59	443898.53	California
2	153441.51	101145.55	407934.54	Florida
3	144372.41	118671.85	383199.62	New York
4	142107.34	91391.77	366168.42	Florida
5	131876.90	99814.71	362861.36	New York
6	134615.46	147198.87	127716.82	California
7	130298.13	145530.06	323876.68	Florida
8	120542.52	148718.95	311613.29	New York
9	123334.88	108679.17	304981.62	California
10	101913.08	110594.11	229160.95	Florida
11	100671.96	91790.61	249744.55	California
12	93863.75	127320.38	249839.44	Florida
13	91992.39	135495.07	252664.93	California
14	119943.24	156547.42	256512.92	Florida
15	114523.61	122616.84	261776.23	New York
16	78013.11	121597.55	264346.06	California
17	94657.16	145077.58	282574.31	New York
18	91749.16	114175.79	294919.57	Florida
19	86419.70	153514.11	0.00	New York
20	76253.86	113867.30	298664.47	California
21	78389.47	153773.43	299737.29	New York
22	73994.56	122782.75	303319.26	Florida
23	67532.53	105751.03	304768.73	Florida
24	77044.01	99281.34	140574.81	New York
25	64664.71	139553.16	137962.62	California
26	75328.87	144135.98	134050.07	Florida
27	72107.60	127864.55	353183.81	New York
28	66051.52	182645.56	118148.20	Florida
29	65605.48	153032.06	107138.38	New York
30	61994.48	115641.28	91131.24	Florida
31	61136.38	152701.92	88218.23	New York
32	63408.86	129219.61	46085.25	California
33	55493.95	103057.49	214634.81	Florida

	RD_Spend	Administration	Marketing_Spend	State
34	46426.07	157693.92	210797.67	California
35	46014.02	85047.44	205517.64	New York
36	28663.76	127056.21	201126.82	Florida
37	44069.95	51283.14	197029.42	California
38	20229.59	65947.93	185265.10	New York
39	38558.51	82982.09	174999.30	California
40	28754.33	118546.05	172795.67	California
41	27892.92	84710.77	164470.71	Florida
42	23640.93	96189.63	148001.11	California
43	15505.73	127382.30	35534.17	New York
44	22177.74	154806.14	28334.72	California
45	1000.23	124153.04	1903.93	New York
46	1315.46	115816.21	297114.46	Florida
47	0.00	135426.92	0.00	California
48	542.05	51743.15	0.00	New York
49	0.00	116983.80	45173.06	California

In [6]:
```
y=df.iloc[:,4:5]
y
```

Out[6]:

	Profit
0	192261.83
1	191792.06
2	191050.39
3	182901.99
4	166187.94
5	156991.12
6	156122.51
7	155752.60
8	152211.77
9	149759.96
10	146121.95
11	144259.40
12	141585.52
13	134307.35
14	132602.65
15	129917.04
16	126992.93
17	125370.37
18	124266.90
19	122776.86
20	118474.03
21	111313.02
22	110352.25
23	108733.99
24	108552.04
25	107404.34
26	105733.54
27	105008.31
28	103282.38
29	101004.64
30	99937.59
31	97483.56
32	97427.84
33	96778.92

	Profit
34	96712.80
35	96479.51
36	90708.19
37	89949.14
38	81229.06
39	81005.76
40	78239.91
41	77798.83
42	71498.49
43	69758.98
44	65200.33
45	64926.08
46	49490.75
47	42559.73
48	35673.41
49	14681.40

Performing Label Encoding

In [ ]:
```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
```

In [8]:
```
x['State']=le.fit_transform(x['State'])
x
```

Out[8]:

	RD_Spend	Administration	Marketing_Spend	State
0	165349.20	136897.80	471784.10	2
1	162597.70	151377.59	443898.53	0
2	153441.51	101145.55	407934.54	1
3	144372.41	118671.85	383199.62	2
4	142107.34	91391.77	366168.42	1
5	131876.90	99814.71	362861.36	2
6	134615.46	147198.87	127716.82	0
7	130298.13	145530.06	323876.68	1
8	120542.52	148718.95	311613.29	2
9	123334.88	108679.17	304981.62	0
10	101913.08	110594.11	229160.95	1
11	100671.96	91790.61	249744.55	0

In [9]:
```
x.shape
```

Out[9]: (50, 4)

Performing Sequential Operations

In [10]:
```
from keras.layers.core import Dense
```

In [13]:
```
from numpy import loadtxt
from keras.models import Sequential
```

In [14]:
```
model=Sequential()
model.add(Dense(12,input_dim=4,kernel_initializer='normal',activation='relu'))
model.add(Dense(8,kernel_initializer='normal',activation='relu'))
model.add(Dense(1,kernel_initializer='normal'))
```

In [15]:
```
model.compile(loss='mean_squared_error',optimizer='adam')
```

In [16]:
```
model
```

Out[16]:
```
<tensorflow.python.keras.engine.sequential.Sequential at 0x1a48d649160>
```

Fitting the Model

In [19]:
```
model.fit(x,y,epochs=500,batch_size=10)
```

```
Epoch 1/500
5/5 [==============================] - 0s 989us/step - loss: 179712944.0000
Epoch 2/500
5/5 [==============================] - 0s 817us/step - loss: 180947392.0000
Epoch 3/500
5/5 [==============================] - 0s 880us/step - loss: 178553936.0000
Epoch 4/500
5/5 [==============================] - 0s 1ms/step - loss: 178594880.0000
Epoch 5/500
5/5 [==============================] - 0s 1ms/step - loss: 178782272.0000
Epoch 6/500
5/5 [==============================] - 0s 1ms/step - loss: 179211536.0000
Epoch 7/500
5/5 [==============================] - 0s 1ms/step - loss: 178550848.0000
Epoch 8/500
5/5 [==============================] - 0s 1ms/step - loss: 177751936.0000
Epoch 9/500
5/5 [==============================] - 0s 1ms/step - loss: 179224592.0000
Epoch 10/500
5/5 [==============================] - 0s 1ms/step - loss: 177832496.0000
Epoch 11/500
5/5 [==============================] - 0s 979us/step - loss: 180587936.0000
Epoch 12/500
5/5 [==============================] - 0s 1ms/step - loss: 179823088.0000
Epoch 13/500
5/5 [==============================] - 0s 1ms/step - loss: 179216080.0000
Epoch 14/500
5/5 [==============================] - 0s 848us/step - loss: 177704304.0000
Epoch 15/500
5/5 [==============================] - 0s 1ms/step - loss: 177549840.0000
Epoch 16/500
5/5 [==============================] - 0s 972us/step - loss: 183354496.0000
Epoch 17/500
5/5 [==============================] - 0s 1ms/step - loss: 180217360.0000
Epoch 18/500
5/5 [==============================] - 0s 783us/step - loss: 177767728.0000
Epoch 19/500
5/5 [==============================] - 0s 1ms/step - loss: 179426384.0000
Epoch 20/500
5/5 [==============================] - 0s 1ms/step - loss: 179058176.0000
Epoch 21/500
5/5 [==============================] - 0s 921us/step - loss: 178912864.0000
Epoch 22/500
5/5 [==============================] - 0s 1ms/step - loss: 178166944.0000
Epoch 23/500
5/5 [==============================] - 0s 1ms/step - loss: 178284240.0000
Epoch 24/500
5/5 [==============================] - 0s 1ms/step - loss: 178853808.0000
Epoch 25/500
5/5 [==============================] - 0s 1ms/step - loss: 178208384.0000
Epoch 26/500
5/5 [==============================] - 0s 1ms/step - loss: 178358544.0000
Epoch 27/500
5/5 [==============================] - 0s 1ms/step - loss: 177853008.0000
```

```
Epoch 28/500
5/5 [==============================] - 0s 1ms/step - loss: 177958752.0000
Epoch 29/500
5/5 [==============================] - 0s 997us/step - loss: 177672688.0000
Epoch 30/500
5/5 [==============================] - 0s 1ms/step - loss: 181289248.0000
Epoch 31/500
5/5 [==============================] - 0s 1ms/step - loss: 178394432.0000
Epoch 32/500
5/5 [==============================] - 0s 2ms/step - loss: 179449440.0000
Epoch 33/500
5/5 [==============================] - 0s 1ms/step - loss: 178046000.0000
Epoch 34/500
5/5 [==============================] - 0s 1ms/step - loss: 182044960.0000
Epoch 35/500
5/5 [==============================] - 0s 1ms/step - loss: 177809792.0000
Epoch 36/500
5/5 [==============================] - 0s 1ms/step - loss: 177868880.0000
Epoch 37/500
5/5 [==============================] - 0s 1ms/step - loss: 179198608.0000
Epoch 38/500
5/5 [==============================] - 0s 1ms/step - loss: 179879344.0000
Epoch 39/500
5/5 [==============================] - 0s 1ms/step - loss: 177159696.0000
Epoch 40/500
5/5 [==============================] - 0s 1ms/step - loss: 183358416.0000
Epoch 41/500
5/5 [==============================] - 0s 1ms/step - loss: 178824000.0000
Epoch 42/500
5/5 [==============================] - 0s 2ms/step - loss: 177807504.0000
Epoch 43/500
5/5 [==============================] - 0s 1ms/step - loss: 178228384.0000
Epoch 44/500
5/5 [==============================] - ETA: 0s - loss: 222743808.000 - 0s 997u
s/step - loss: 178540912.0000
Epoch 45/500
5/5 [==============================] - 0s 970us/step - loss: 178018912.0000
Epoch 46/500
5/5 [==============================] - 0s 858us/step - loss: 178674560.0000
Epoch 47/500
5/5 [==============================] - 0s 2ms/step - loss: 180608800.0000
Epoch 48/500
5/5 [==============================] - 0s 1ms/step - loss: 178418608.0000
Epoch 49/500
5/5 [==============================] - 0s 1ms/step - loss: 181643248.0000
Epoch 50/500
5/5 [==============================] - 0s 2ms/step - loss: 177502624.0000
Epoch 51/500
5/5 [==============================] - 0s 1ms/step - loss: 184402896.0000
Epoch 52/500
5/5 [==============================] - 0s 1ms/step - loss: 179569200.0000
Epoch 53/500
5/5 [==============================] - 0s 1ms/step - loss: 184805088.0000
Epoch 54/500
5/5 [==============================] - 0s 1ms/step - loss: 179322096.0000
Epoch 55/500
5/5 [==============================] - 0s 2ms/step - loss: 177986240.0000
```

```
Epoch 56/500
5/5 [==============================] - 0s 1ms/step - loss: 178502000.0000
Epoch 57/500
5/5 [==============================] - 0s 1ms/step - loss: 178428400.0000
Epoch 58/500
5/5 [==============================] - 0s 999us/step - loss: 179392192.0000
Epoch 59/500
5/5 [==============================] - 0s 1ms/step - loss: 178940480.0000
Epoch 60/500
5/5 [==============================] - 0s 1ms/step - loss: 178280544.0000
Epoch 61/500
5/5 [==============================] - 0s 1ms/step - loss: 178114432.0000
Epoch 62/500
5/5 [==============================] - 0s 1ms/step - loss: 177829664.0000
Epoch 63/500
5/5 [==============================] - 0s 1ms/step - loss: 178536736.0000
Epoch 64/500
5/5 [==============================] - 0s 1ms/step - loss: 177842816.0000
Epoch 65/500
5/5 [==============================] - 0s 1ms/step - loss: 177669504.0000
Epoch 66/500
5/5 [==============================] - 0s 1ms/step - loss: 179205776.0000
Epoch 67/500
5/5 [==============================] - 0s 1ms/step - loss: 177325184.0000
Epoch 68/500
5/5 [==============================] - 0s 2ms/step - loss: 178856080.0000
Epoch 69/500
5/5 [==============================] - 0s 1ms/step - loss: 178176464.0000
Epoch 70/500
5/5 [==============================] - 0s 1ms/step - loss: 177876048.0000
Epoch 71/500
5/5 [==============================] - 0s 2ms/step - loss: 180371104.0000
Epoch 72/500
5/5 [==============================] - 0s 1ms/step - loss: 178294688.0000
Epoch 73/500
5/5 [==============================] - 0s 1ms/step - loss: 179646896.0000
Epoch 74/500
5/5 [==============================] - 0s 1ms/step - loss: 181306416.0000
Epoch 75/500
5/5 [==============================] - 0s 1ms/step - loss: 178719808.0000
Epoch 76/500
5/5 [==============================] - 0s 1ms/step - loss: 179773248.0000
Epoch 77/500
5/5 [==============================] - 0s 1ms/step - loss: 178849936.0000
Epoch 78/500
5/5 [==============================] - 0s 2ms/step - loss: 178118000.0000
Epoch 79/500
5/5 [==============================] - 0s 1ms/step - loss: 178689024.0000
Epoch 80/500
5/5 [==============================] - 0s 1ms/step - loss: 180215760.0000
Epoch 81/500
5/5 [==============================] - 0s 2ms/step - loss: 178705472.0000
Epoch 82/500
5/5 [==============================] - 0s 1ms/step - loss: 185363808.0000
Epoch 83/500
5/5 [==============================] - 0s 1ms/step - loss: 178118432.0000
Epoch 84/500
```

```
5/5 [==============================] - 0s 2ms/step - loss: 177680592.0000
Epoch 85/500
5/5 [==============================] - 0s 1ms/step - loss: 179375392.0000
Epoch 86/500
5/5 [==============================] - 0s 2ms/step - loss: 178392256.0000
Epoch 87/500
5/5 [==============================] - 0s 942us/step - loss: 182938240.0000
Epoch 88/500
5/5 [==============================] - 0s 1ms/step - loss: 180889552.0000
Epoch 89/500
5/5 [==============================] - 0s 1ms/step - loss: 179928576.0000
Epoch 90/500
5/5 [==============================] - 0s 1ms/step - loss: 179325744.0000
Epoch 91/500
5/5 [==============================] - 0s 1ms/step - loss: 177902960.0000
Epoch 92/500
5/5 [==============================] - 0s 822us/step - loss: 180943360.0000
Epoch 93/500
5/5 [==============================] - 0s 1ms/step - loss: 180767696.0000
Epoch 94/500
5/5 [==============================] - 0s 818us/step - loss: 179476240.0000
Epoch 95/500
5/5 [==============================] - 0s 2ms/step - loss: 182596832.0000
Epoch 96/500
5/5 [==============================] - 0s 1ms/step - loss: 179401296.0000
Epoch 97/500
5/5 [==============================] - 0s 2ms/step - loss: 179163088.0000
Epoch 98/500
5/5 [==============================] - 0s 1ms/step - loss: 178721600.0000
Epoch 99/500
5/5 [==============================] - 0s 1ms/step - loss: 178552960.0000
Epoch 100/500
5/5 [==============================] - 0s 809us/step - loss: 178345200.0000
Epoch 101/500
5/5 [==============================] - 0s 1ms/step - loss: 178606528.0000
Epoch 102/500
5/5 [==============================] - 0s 895us/step - loss: 177912224.0000
Epoch 103/500
5/5 [==============================] - 0s 945us/step - loss: 177653616.0000
Epoch 104/500
5/5 [==============================] - 0s 758us/step - loss: 177795792.0000
Epoch 105/500
5/5 [==============================] - 0s 1ms/step - loss: 178111120.0000
Epoch 106/500
5/5 [==============================] - 0s 921us/step - loss: 178135248.0000
Epoch 107/500
5/5 [==============================] - 0s 1ms/step - loss: 177964112.0000
Epoch 108/500
5/5 [==============================] - 0s 765us/step - loss: 177738976.0000
Epoch 109/500
5/5 [==============================] - 0s 998us/step - loss: 178143104.0000
Epoch 110/500
5/5 [==============================] - 0s 882us/step - loss: 181360928.0000
Epoch 111/500
5/5 [==============================] - 0s 1ms/step - loss: 178303760.0000
Epoch 112/500
5/5 [==============================] - 0s 1ms/step - loss: 178452256.0000
```

```
Epoch 113/500
5/5 [==============================] - 0s 1ms/step - loss: 179051392.0000
Epoch 114/500
5/5 [==============================] - 0s 1ms/step - loss: 177694672.0000
Epoch 115/500
5/5 [==============================] - 0s 1ms/step - loss: 178204688.0000
Epoch 116/500
5/5 [==============================] - 0s 1ms/step - loss: 178538720.0000
Epoch 117/500
5/5 [==============================] - 0s 1ms/step - loss: 178886416.0000
Epoch 118/500
5/5 [==============================] - 0s 1ms/step - loss: 177638976.0000
Epoch 119/500
5/5 [==============================] - 0s 1ms/step - loss: 178613904.0000
Epoch 120/500
5/5 [==============================] - 0s 1ms/step - loss: 179205184.0000
Epoch 121/500
5/5 [==============================] - 0s 1ms/step - loss: 180318512.0000
Epoch 122/500
5/5 [==============================] - 0s 1ms/step - loss: 179173904.0000
Epoch 123/500
5/5 [==============================] - 0s 1ms/step - loss: 184454432.0000
Epoch 124/500
5/5 [==============================] - 0s 1ms/step - loss: 178485520.0000
Epoch 125/500
5/5 [==============================] - 0s 908us/step - loss: 177266096.0000
Epoch 126/500
5/5 [==============================] - 0s 819us/step - loss: 177660144.0000
Epoch 127/500
5/5 [==============================] - 0s 2ms/step - loss: 180279376.0000
Epoch 128/500
5/5 [==============================] - 0s 1ms/step - loss: 177949696.0000
Epoch 129/500
5/5 [==============================] - 0s 1ms/step - loss: 178469824.0000
Epoch 130/500
5/5 [==============================] - 0s 1ms/step - loss: 178645504.0000
Epoch 131/500
5/5 [==============================] - 0s 1ms/step - loss: 178531024.0000
Epoch 132/500
5/5 [==============================] - 0s 1ms/step - loss: 178196160.0000
Epoch 133/500
5/5 [==============================] - 0s 1ms/step - loss: 179440880.0000
Epoch 134/500
5/5 [==============================] - 0s 1ms/step - loss: 179233408.0000
Epoch 135/500
5/5 [==============================] - 0s 1ms/step - loss: 180011600.0000
Epoch 136/500
5/5 [==============================] - 0s 1ms/step - loss: 178014128.0000
Epoch 137/500
5/5 [==============================] - 0s 2ms/step - loss: 178660224.0000
Epoch 138/500
5/5 [==============================] - 0s 1ms/step - loss: 177624304.0000
Epoch 139/500
5/5 [==============================] - 0s 1ms/step - loss: 179027584.0000
Epoch 140/500
5/5 [==============================] - 0s 2ms/step - loss: 178439184.0000
Epoch 141/500
```

```
5/5 [==============================] - 0s 1ms/step - loss: 177270640.0000
Epoch 142/500
5/5 [==============================] - 0s 1ms/step - loss: 178245312.0000
Epoch 143/500
5/5 [==============================] - 0s 1ms/step - loss: 177981280.0000
Epoch 144/500
5/5 [==============================] - 0s 946us/step - loss: 178635136.0000
Epoch 145/500
5/5 [==============================] - 0s 1ms/step - loss: 179977856.0000
Epoch 146/500
5/5 [==============================] - 0s 1ms/step - loss: 178324704.0000
Epoch 147/500
5/5 [==============================] - 0s 2ms/step - loss: 178382496.0000
Epoch 148/500
5/5 [==============================] - 0s 1ms/step - loss: 179342320.0000
Epoch 149/500
5/5 [==============================] - 0s 2ms/step - loss: 179518896.0000
Epoch 150/500
5/5 [==============================] - 0s 1ms/step - loss: 178237440.0000
Epoch 151/500
5/5 [==============================] - 0s 1ms/step - loss: 178273440.0000
Epoch 152/500
5/5 [==============================] - 0s 1ms/step - loss: 179394032.0000
Epoch 153/500
5/5 [==============================] - 0s 794us/step - loss: 177932608.0000
Epoch 154/500
5/5 [==============================] - 0s 1ms/step - loss: 177970528.0000
Epoch 155/500
5/5 [==============================] - 0s 984us/step - loss: 177750032.0000
Epoch 156/500
5/5 [==============================] - 0s 1ms/step - loss: 178600016.0000
Epoch 157/500
5/5 [==============================] - 0s 1ms/step - loss: 177933664.0000
Epoch 158/500
5/5 [==============================] - 0s 987us/step - loss: 178550464.0000
Epoch 159/500
5/5 [==============================] - 0s 2ms/step - loss: 178295680.0000
Epoch 160/500
5/5 [==============================] - 0s 1ms/step - loss: 178164448.0000
Epoch 161/500
5/5 [==============================] - 0s 1ms/step - loss: 177754768.0000
Epoch 162/500
5/5 [==============================] - 0s 1ms/step - loss: 177820624.0000
Epoch 163/500
5/5 [==============================] - 0s 1ms/step - loss: 178123408.0000
Epoch 164/500
5/5 [==============================] - 0s 2ms/step - loss: 177751280.0000
Epoch 165/500
5/5 [==============================] - 0s 1ms/step - loss: 178377360.0000
Epoch 166/500
5/5 [==============================] - 0s 1ms/step - loss: 177750016.0000
Epoch 167/500
5/5 [==============================] - 0s 1ms/step - loss: 177752304.0000
Epoch 168/500
5/5 [==============================] - 0s 1ms/step - loss: 179094224.0000
Epoch 169/500
5/5 [==============================] - 0s 1ms/step - loss: 177895504.0000
```

```
Epoch 170/500
5/5 [==============================] - 0s 1ms/step - loss: 180205728.0000
Epoch 171/500
5/5 [==============================] - 0s 1ms/step - loss: 178494144.0000
Epoch 172/500
5/5 [==============================] - 0s 1ms/step - loss: 179125776.0000
Epoch 173/500
5/5 [==============================] - 0s 1ms/step - loss: 180880816.0000
Epoch 174/500
5/5 [==============================] - 0s 2ms/step - loss: 179203216.0000
Epoch 175/500
5/5 [==============================] - 0s 1ms/step - loss: 179485456.0000
Epoch 176/500
5/5 [==============================] - 0s 862us/step - loss: 180728000.0000
Epoch 177/500
5/5 [==============================] - 0s 1ms/step - loss: 180368816.0000
Epoch 178/500
5/5 [==============================] - 0s 1ms/step - loss: 179363680.0000
Epoch 179/500
5/5 [==============================] - 0s 1ms/step - loss: 177985248.0000
Epoch 180/500
5/5 [==============================] - 0s 1ms/step - loss: 178024832.0000
Epoch 181/500
5/5 [==============================] - 0s 1ms/step - loss: 178516288.0000
Epoch 182/500
5/5 [==============================] - 0s 1ms/step - loss: 178020368.0000
Epoch 183/500
5/5 [==============================] - 0s 1ms/step - loss: 178033136.0000
Epoch 184/500
5/5 [==============================] - 0s 1ms/step - loss: 179349952.0000
Epoch 185/500
5/5 [==============================] - 0s 724us/step - loss: 177881808.0000
Epoch 186/500


5/5 [==============================] - 0s 1ms/step - loss: 178097856.0000
Epoch 187/500
5/5 [==============================] - 0s 797us/step - loss: 179286080.0000
Epoch 188/500
5/5 [==============================] - 0s 1ms/step - loss: 178360080.0000
Epoch 189/500
5/5 [==============================] - 0s 879us/step - loss: 178792528.0000
Epoch 190/500
5/5 [==============================] - 0s 1ms/step - loss: 177702112.0000
Epoch 191/500
5/5 [==============================] - 0s 996us/step - loss: 177673584.0000
Epoch 192/500
5/5 [==============================] - 0s 2ms/step - loss: 178557024.0000
Epoch 193/500
5/5 [==============================] - 0s 901us/step - loss: 177689968.0000
Epoch 194/500
5/5 [==============================] - 0s 1ms/step - loss: 178285792.0000
Epoch 195/500
5/5 [==============================] - 0s 1ms/step - loss: 179242272.0000
Epoch 196/500
5/5 [==============================] - 0s 1ms/step - loss: 177920720.0000
Epoch 197/500
5/5 [==============================] - 0s 997us/step - loss: 178555520.0000
```

```
Epoch 198/500
5/5 [==============================] - 0s 1ms/step - loss: 180814400.0000
Epoch 199/500
5/5 [==============================] - 0s 613us/step - loss: 178558656.0000
Epoch 200/500
5/5 [==============================] - 0s 1ms/step - loss: 177681936.0000
Epoch 201/500
5/5 [==============================] - 0s 982us/step - loss: 181660992.0000
Epoch 202/500
5/5 [==============================] - 0s 939us/step - loss: 182284288.0000
Epoch 203/500
5/5 [==============================] - 0s 950us/step - loss: 178078720.0000
Epoch 204/500
5/5 [==============================] - 0s 1ms/step - loss: 178753344.0000
Epoch 205/500
5/5 [==============================] - 0s 868us/step - loss: 177827824.0000
Epoch 206/500
5/5 [==============================] - 0s 1ms/step - loss: 178814784.0000
Epoch 207/500
5/5 [==============================] - 0s 771us/step - loss: 181476640.0000
Epoch 208/500
5/5 [==============================] - 0s 918us/step - loss: 177664656.0000
Epoch 209/500
5/5 [==============================] - 0s 956us/step - loss: 181274336.0000
Epoch 210/500
5/5 [==============================] - 0s 1ms/step - loss: 181096176.0000
Epoch 211/500
5/5 [==============================] - 0s 1ms/step - loss: 180092976.0000
Epoch 212/500
5/5 [==============================] - 0s 1ms/step - loss: 177308000.0000
Epoch 213/500
5/5 [==============================] - 0s 1ms/step - loss: 181504048.0000
Epoch 214/500
5/5 [==============================] - 0s 1ms/step - loss: 178332672.0000
Epoch 215/500
5/5 [==============================] - 0s 1ms/step - loss: 177888544.0000
Epoch 216/500
5/5 [==============================] - 0s 1ms/step - loss: 178532784.0000
Epoch 217/500
5/5 [==============================] - 0s 1ms/step - loss: 178134944.0000
Epoch 218/500
5/5 [==============================] - 0s 1ms/step - loss: 178208960.0000
Epoch 219/500
5/5 [==============================] - 0s 1ms/step - loss: 178039072.0000
Epoch 220/500
5/5 [==============================] - 0s 1ms/step - loss: 178369376.0000
Epoch 221/500
5/5 [==============================] - 0s 1ms/step - loss: 178321088.0000
Epoch 222/500
5/5 [==============================] - 0s 1ms/step - loss: 177613232.0000
Epoch 223/500
5/5 [==============================] - 0s 1ms/step - loss: 178210576.0000
Epoch 224/500
5/5 [==============================] - 0s 1ms/step - loss: 177777856.0000
Epoch 225/500
5/5 [==============================] - 0s 1ms/step - loss: 177719296.0000
Epoch 226/500
```

```
5/5 [==============================] - 0s 1ms/step - loss: 180689568.0000
Epoch 227/500
5/5 [==============================] - 0s 1ms/step - loss: 177493968.0000
Epoch 228/500
5/5 [==============================] - 0s 990us/step - loss: 178952432.0000
Epoch 229/500
5/5 [==============================] - 0s 1ms/step - loss: 185586992.0000
Epoch 230/500
5/5 [==============================] - 0s 1ms/step - loss: 179196192.0000
Epoch 231/500
5/5 [==============================] - 0s 1ms/step - loss: 177463104.0000
Epoch 232/500
5/5 [==============================] - 0s 1ms/step - loss: 180975888.0000
Epoch 233/500
5/5 [==============================] - 0s 1ms/step - loss: 178304976.0000
Epoch 234/500
5/5 [==============================] - 0s 1ms/step - loss: 178707088.0000
Epoch 235/500
5/5 [==============================] - 0s 977us/step - loss: 178720720.0000
Epoch 236/500
5/5 [==============================] - 0s 1ms/step - loss: 178755136.0000
Epoch 237/500
5/5 [==============================] - 0s 1ms/step - loss: 177328320.0000
Epoch 238/500
5/5 [==============================] - 0s 1ms/step - loss: 178234048.0000
Epoch 239/500
5/5 [==============================] - 0s 1ms/step - loss: 178775280.0000
Epoch 240/500
5/5 [==============================] - 0s 2ms/step - loss: 178190944.0000
Epoch 241/500
5/5 [==============================] - 0s 1ms/step - loss: 178812320.0000
Epoch 242/500
5/5 [==============================] - 0s 1ms/step - loss: 177741872.0000
Epoch 243/500
5/5 [==============================] - 0s 1ms/step - loss: 178139632.0000
Epoch 244/500
5/5 [==============================] - 0s 1ms/step - loss: 180322592.0000
Epoch 245/500
5/5 [==============================] - 0s 2ms/step - loss: 182366160.0000
Epoch 246/500
5/5 [==============================] - 0s 1ms/step - loss: 178318896.0000
Epoch 247/500
5/5 [==============================] - 0s 1ms/step - loss: 177283584.0000
Epoch 248/500
5/5 [==============================] - 0s 1ms/step - loss: 181917040.0000
Epoch 249/500
5/5 [==============================] - 0s 1ms/step - loss: 179480944.0000
Epoch 250/500
5/5 [==============================] - 0s 1ms/step - loss: 176604512.0000
Epoch 251/500
5/5 [==============================] - 0s 1ms/step - loss: 179879888.0000
Epoch 252/500
5/5 [==============================] - 0s 1ms/step - loss: 180709440.0000
Epoch 253/500
5/5 [==============================] - 0s 932us/step - loss: 180029232.0000
Epoch 254/500
5/5 [==============================] - 0s 952us/step - loss: 178574144.0000
```

```
Epoch 255/500
5/5 [==============================] - 0s 1ms/step - loss: 178280000.0000
Epoch 256/500
5/5 [==============================] - 0s 1ms/step - loss: 177809712.0000
Epoch 257/500
5/5 [==============================] - 0s 933us/step - loss: 179088320.0000
Epoch 258/500
5/5 [==============================] - 0s 1ms/step - loss: 177611040.0000
Epoch 259/500
5/5 [==============================] - 0s 1ms/step - loss: 177775536.0000
Epoch 260/500
5/5 [==============================] - 0s 970us/step - loss: 178031840.0000
Epoch 261/500
5/5 [==============================] - 0s 1ms/step - loss: 179875552.0000
Epoch 262/500
5/5 [==============================] - 0s 912us/step - loss: 178900176.0000
Epoch 263/500
5/5 [==============================] - 0s 1ms/step - loss: 179651952.0000
Epoch 264/500
5/5 [==============================] - 0s 2ms/step - loss: 180563392.0000
Epoch 265/500
5/5 [==============================] - 0s 1ms/step - loss: 178227440.0000
Epoch 266/500
5/5 [==============================] - 0s 1ms/step - loss: 178227328.0000
Epoch 267/500
5/5 [==============================] - 0s 1ms/step - loss: 177611024.0000
Epoch 268/500
5/5 [==============================] - 0s 1ms/step - loss: 183354736.0000
Epoch 269/500
5/5 [==============================] - 0s 1ms/step - loss: 181265728.0000
Epoch 270/500
5/5 [==============================] - 0s 942us/step - loss: 180059888.0000
Epoch 271/500
5/5 [==============================] - 0s 694us/step - loss: 178167792.0000
Epoch 272/500
5/5 [==============================] - 0s 893us/step - loss: 180176240.0000
Epoch 273/500
5/5 [==============================] - 0s 963us/step - loss: 177541680.0000
Epoch 274/500
5/5 [==============================] - 0s 1ms/step - loss: 178047440.0000
Epoch 275/500
5/5 [==============================] - 0s 2ms/step - loss: 178615664.0000
Epoch 276/500
5/5 [==============================] - 0s 1ms/step - loss: 178958576.0000
Epoch 277/500
5/5 [==============================] - 0s 1ms/step - loss: 179264096.0000
Epoch 278/500
5/5 [==============================] - 0s 1ms/step - loss: 178278560.0000
Epoch 279/500
5/5 [==============================] - 0s 926us/step - loss: 177876096.0000
Epoch 280/500
5/5 [==============================] - 0s 2ms/step - loss: 178068032.0000
Epoch 281/500
5/5 [==============================] - 0s 1ms/step - loss: 181056464.0000
Epoch 282/500
5/5 [==============================] - 0s 1ms/step - loss: 177889728.0000
Epoch 283/500
```

```
5/5 [==============================] - 0s 1ms/step - loss: 179031984.0000
Epoch 284/500
5/5 [==============================] - 0s 2ms/step - loss: 179823104.0000
Epoch 285/500
5/5 [==============================] - 0s 958us/step - loss: 177951584.0000
Epoch 286/500
5/5 [==============================] - 0s 2ms/step - loss: 178587296.0000
Epoch 287/500
5/5 [==============================] - 0s 875us/step - loss: 178899408.0000
Epoch 288/500
5/5 [==============================] - 0s 1ms/step - loss: 178359360.0000
Epoch 289/500
5/5 [==============================] - 0s 2ms/step - loss: 177616528.0000
Epoch 290/500
5/5 [==============================] - 0s 1ms/step - loss: 178033200.0000
Epoch 291/500
5/5 [==============================] - 0s 1ms/step - loss: 178257712.0000
Epoch 292/500
5/5 [==============================] - 0s 1ms/step - loss: 178862288.0000
Epoch 293/500
5/5 [==============================] - 0s 1ms/step - loss: 178525936.0000
Epoch 294/500
5/5 [==============================] - 0s 1ms/step - loss: 177670352.0000
Epoch 295/500
5/5 [==============================] - 0s 1ms/step - loss: 177720528.0000
Epoch 296/500
5/5 [==============================] - 0s 744us/step - loss: 178222816.0000
Epoch 297/500
5/5 [==============================] - 0s 1ms/step - loss: 179178512.0000
Epoch 298/500
5/5 [==============================] - 0s 1ms/step - loss: 180674880.0000
Epoch 299/500
5/5 [==============================] - 0s 1ms/step - loss: 178433808.0000
Epoch 300/500
5/5 [==============================] - 0s 1ms/step - loss: 178040736.0000
Epoch 301/500
5/5 [==============================] - 0s 1ms/step - loss: 178402208.0000
Epoch 302/500
5/5 [==============================] - 0s 1ms/step - loss: 179194560.0000
Epoch 303/500
5/5 [==============================] - 0s 1ms/step - loss: 181000320.0000
Epoch 304/500
5/5 [==============================] - 0s 2ms/step - loss: 177415360.0000
Epoch 305/500
5/5 [==============================] - 0s 1ms/step - loss: 178179488.0000
Epoch 306/500
5/5 [==============================] - 0s 1ms/step - loss: 178612544.0000
Epoch 307/500
5/5 [==============================] - 0s 1ms/step - loss: 179348704.0000
Epoch 308/500
5/5 [==============================] - 0s 1ms/step - loss: 177491968.0000
Epoch 309/500
5/5 [==============================] - 0s 1ms/step - loss: 178864176.0000
Epoch 310/500
5/5 [==============================] - 0s 1ms/step - loss: 178988672.0000
Epoch 311/500
5/5 [==============================] - 0s 1ms/step - loss: 178590288.0000
```

```
Epoch 312/500
5/5 [==============================] - 0s 1ms/step - loss: 178647536.0000
Epoch 313/500
5/5 [==============================] - 0s 958us/step - loss: 177912096.0000
Epoch 314/500
5/5 [==============================] - 0s 999us/step - loss: 178731360.0000
Epoch 315/500
5/5 [==============================] - 0s 1ms/step - loss: 178523408.0000
Epoch 316/500
5/5 [==============================] - 0s 2ms/step - loss: 179384320.0000
Epoch 317/500
5/5 [==============================] - 0s 1ms/step - loss: 178648896.0000
Epoch 318/500
5/5 [==============================] - 0s 1ms/step - loss: 179049152.0000
Epoch 319/500
5/5 [==============================] - 0s 1ms/step - loss: 180411344.0000
Epoch 320/500
5/5 [==============================] - 0s 2ms/step - loss: 181163168.0000
Epoch 321/500
5/5 [==============================] - 0s 956us/step - loss: 180208352.0000
Epoch 322/500
5/5 [==============================] - 0s 1ms/step - loss: 178615424.0000
Epoch 323/500
5/5 [==============================] - 0s 1ms/step - loss: 178306624.0000
Epoch 324/500
5/5 [==============================] - 0s 1ms/step - loss: 180268976.0000
Epoch 325/500
5/5 [==============================] - 0s 1ms/step - loss: 180258512.0000
Epoch 326/500
5/5 [==============================] - 0s 1ms/step - loss: 178757248.0000
Epoch 327/500
5/5 [==============================] - 0s 1ms/step - loss: 178201168.0000
Epoch 328/500
5/5 [==============================] - 0s 773us/step - loss: 178361472.0000
Epoch 329/500
5/5 [==============================] - 0s 1ms/step - loss: 177610224.0000
Epoch 330/500
5/5 [==============================] - 0s 1ms/step - loss: 180153024.0000
Epoch 331/500
5/5 [==============================] - 0s 1ms/step - loss: 177866336.0000
Epoch 332/500
5/5 [==============================] - 0s 1ms/step - loss: 177744432.0000
Epoch 333/500
5/5 [==============================] - 0s 1ms/step - loss: 178572368.0000
Epoch 334/500
5/5 [==============================] - 0s 926us/step - loss: 177942576.0000
Epoch 335/500
5/5 [==============================] - 0s 845us/step - loss: 177760032.0000
Epoch 336/500
5/5 [==============================] - 0s 993us/step - loss: 177797824.0000
Epoch 337/500
5/5 [==============================] - 0s 1ms/step - loss: 177977424.0000
Epoch 338/500
5/5 [==============================] - 0s 1ms/step - loss: 179005152.0000
Epoch 339/500
5/5 [==============================] - 0s 2ms/step - loss: 180618448.0000
Epoch 340/500
```

```
5/5 [==============================] - 0s 1ms/step - loss: 178261152.0000
Epoch 341/500
5/5 [==============================] - 0s 1ms/step - loss: 178186144.0000
Epoch 342/500
5/5 [==============================] - 0s 871us/step - loss: 178453232.0000
Epoch 343/500
5/5 [==============================] - 0s 1ms/step - loss: 177767264.0000
Epoch 344/500
5/5 [==============================] - 0s 1ms/step - loss: 178863520.0000
Epoch 345/500
5/5 [==============================] - 0s 1ms/step - loss: 178154288.0000
Epoch 346/500
5/5 [==============================] - 0s 1ms/step - loss: 178146752.0000
Epoch 347/500
5/5 [==============================] - 0s 1ms/step - loss: 177872704.0000
Epoch 348/500
5/5 [==============================] - 0s 966us/step - loss: 177672544.0000
Epoch 349/500
5/5 [==============================] - 0s 1ms/step - loss: 177871888.0000
Epoch 350/500
5/5 [==============================] - 0s 1ms/step - loss: 178357776.0000
Epoch 351/500
5/5 [==============================] - 0s 1ms/step - loss: 178070240.0000
Epoch 352/500
5/5 [==============================] - 0s 1ms/step - loss: 178024864.0000
Epoch 353/500
5/5 [==============================] - 0s 1ms/step - loss: 179337312.0000
Epoch 354/500
5/5 [==============================] - 0s 1ms/step - loss: 179148640.0000
Epoch 355/500
5/5 [==============================] - 0s 1ms/step - loss: 178917680.0000
Epoch 356/500
5/5 [==============================] - 0s 880us/step - loss: 179300624.0000
Epoch 357/500
5/5 [==============================] - 0s 1ms/step - loss: 178523504.0000
Epoch 358/500
5/5 [==============================] - 0s 1ms/step - loss: 177786144.0000
Epoch 359/500
5/5 [==============================] - 0s 1ms/step - loss: 179192000.0000
Epoch 360/500
5/5 [==============================] - 0s 1ms/step - loss: 177987872.0000
Epoch 361/500
5/5 [==============================] - 0s 1ms/step - loss: 177869440.0000
Epoch 362/500
5/5 [==============================] - 0s 1ms/step - loss: 180387904.0000
Epoch 363/500
5/5 [==============================] - 0s 1ms/step - loss: 180497488.0000
Epoch 364/500
5/5 [==============================] - 0s 1ms/step - loss: 177639488.0000
Epoch 365/500
5/5 [==============================] - 0s 1ms/step - loss: 177549088.0000
Epoch 366/500
5/5 [==============================] - 0s 981us/step - loss: 177772464.0000
Epoch 367/500
5/5 [==============================] - 0s 917us/step - loss: 178712192.0000
Epoch 368/500
5/5 [==============================] - 0s 1ms/step - loss: 177702896.0000
```

```
Epoch 369/500
5/5 [==============================] - 0s 1ms/step - loss: 178392992.0000
Epoch 370/500


5/5 [==============================] - 0s 2ms/step - loss: 178741984.0000
Epoch 371/500
5/5 [==============================] - 0s 1ms/step - loss: 180006912.0000
Epoch 372/500
5/5 [==============================] - 0s 1ms/step - loss: 180238336.0000
Epoch 373/500
5/5 [==============================] - 0s 939us/step - loss: 178034032.0000
Epoch 374/500
5/5 [==============================] - 0s 1ms/step - loss: 177666720.0000
Epoch 375/500
5/5 [==============================] - 0s 977us/step - loss: 179115136.0000
Epoch 376/500
5/5 [==============================] - 0s 1ms/step - loss: 177586320.0000
Epoch 377/500
5/5 [==============================] - 0s 945us/step - loss: 177532720.0000
Epoch 378/500
5/5 [==============================] - 0s 1ms/step - loss: 180628528.0000
Epoch 379/500
5/5 [==============================] - 0s 794us/step - loss: 178477040.0000
Epoch 380/500
5/5 [==============================] - 0s 1ms/step - loss: 177366976.0000
Epoch 381/500
5/5 [==============================] - 0s 913us/step - loss: 178078352.0000
Epoch 382/500
5/5 [==============================] - 0s 1ms/step - loss: 178237872.0000
Epoch 383/500
5/5 [==============================] - 0s 1ms/step - loss: 181091136.0000
Epoch 384/500
5/5 [==============================] - 0s 1ms/step - loss: 178362320.0000
Epoch 385/500
5/5 [==============================] - 0s 1ms/step - loss: 180642144.0000
Epoch 386/500
5/5 [==============================] - 0s 1ms/step - loss: 178246368.0000
Epoch 387/500
5/5 [==============================] - 0s 1ms/step - loss: 180316400.0000
Epoch 388/500
5/5 [==============================] - 0s 1000us/step - loss: 177359280.0000
Epoch 389/500
5/5 [==============================] - 0s 2ms/step - loss: 186462704.0000
Epoch 390/500
5/5 [==============================] - 0s 791us/step - loss: 182024688.0000
Epoch 391/500
5/5 [==============================] - 0s 1ms/step - loss: 178745184.0000
Epoch 392/500
5/5 [==============================] - 0s 1ms/step - loss: 177920016.0000
Epoch 393/500
5/5 [==============================] - 0s 1ms/step - loss: 178309424.0000
Epoch 394/500
5/5 [==============================] - 0s 1ms/step - loss: 177917248.0000
Epoch 395/500
5/5 [==============================] - 0s 957us/step - loss: 178711712.0000
Epoch 396/500
```

```
5/5 [==============================] - 0s 1ms/step - loss: 178589984.0000
Epoch 397/500
5/5 [==============================] - 0s 1ms/step - loss: 178949488.0000
Epoch 398/500
5/5 [==============================] - 0s 1ms/step - loss: 178247088.0000
Epoch 399/500
5/5 [==============================] - 0s 1ms/step - loss: 178944752.0000
Epoch 400/500
5/5 [==============================] - 0s 2ms/step - loss: 177944128.0000
Epoch 401/500
5/5 [==============================] - 0s 899us/step - loss: 182984256.0000
Epoch 402/500
5/5 [==============================] - 0s 959us/step - loss: 177873472.0000
Epoch 403/500
5/5 [==============================] - 0s 1ms/step - loss: 177863616.0000
Epoch 404/500
5/5 [==============================] - 0s 1ms/step - loss: 181179200.0000
Epoch 405/500
5/5 [==============================] - 0s 2ms/step - loss: 177950704.0000
Epoch 406/500
5/5 [==============================] - 0s 1ms/step - loss: 176983088.0000
Epoch 407/500
5/5 [==============================] - 0s 1ms/step - loss: 178075936.0000
Epoch 408/500
5/5 [==============================] - 0s 1ms/step - loss: 179061616.0000
Epoch 409/500
5/5 [==============================] - 0s 1ms/step - loss: 179739968.0000
Epoch 410/500
5/5 [==============================] - 0s 859us/step - loss: 177862960.0000
Epoch 411/500
5/5 [==============================] - 0s 1ms/step - loss: 179338192.0000
Epoch 412/500
5/5 [==============================] - 0s 1ms/step - loss: 178726464.0000
Epoch 413/500
5/5 [==============================] - 0s 1ms/step - loss: 178529840.0000
Epoch 414/500
5/5 [==============================] - 0s 1ms/step - loss: 178013904.0000
Epoch 415/500
5/5 [==============================] - 0s 1ms/step - loss: 178306352.0000
Epoch 416/500
5/5 [==============================] - 0s 1ms/step - loss: 179167296.0000
Epoch 417/500
5/5 [==============================] - 0s 845us/step - loss: 180313296.0000
Epoch 418/500
5/5 [==============================] - 0s 1ms/step - loss: 179253120.0000
Epoch 419/500
5/5 [==============================] - 0s 1ms/step - loss: 184539184.0000
Epoch 420/500
5/5 [==============================] - 0s 1ms/step - loss: 180723104.0000
Epoch 421/500
5/5 [==============================] - 0s 2ms/step - loss: 177769248.0000
Epoch 422/500
5/5 [==============================] - 0s 1ms/step - loss: 178605264.0000
Epoch 423/500
5/5 [==============================] - 0s 1ms/step - loss: 178218912.0000
Epoch 424/500
5/5 [==============================] - 0s 1ms/step - loss: 179712496.0000
```

```
Epoch 425/500
5/5 [==============================] - 0s 1ms/step - loss: 178558112.0000
Epoch 426/500
5/5 [==============================] - 0s 1ms/step - loss: 178410848.0000
Epoch 427/500
5/5 [==============================] - 0s 1ms/step - loss: 178976048.0000
Epoch 428/500
5/5 [==============================] - 0s 2ms/step - loss: 178398496.0000
Epoch 429/500
5/5 [==============================] - 0s 1ms/step - loss: 179349712.0000
Epoch 430/500
5/5 [==============================] - 0s 1ms/step - loss: 178710016.0000
Epoch 431/500
5/5 [==============================] - 0s 1ms/step - loss: 180096080.0000
Epoch 432/500
5/5 [==============================] - 0s 1ms/step - loss: 179081216.0000
Epoch 433/500
5/5 [==============================] - 0s 1ms/step - loss: 177674896.0000
Epoch 434/500
5/5 [==============================] - 0s 1ms/step - loss: 177782992.0000
Epoch 435/500
5/5 [==============================] - 0s 1ms/step - loss: 179168640.0000
Epoch 436/500
5/5 [==============================] - 0s 1ms/step - loss: 177854528.0000
Epoch 437/500
5/5 [==============================] - 0s 1ms/step - loss: 181263952.0000
Epoch 438/500
5/5 [==============================] - 0s 1ms/step - loss: 178816928.0000
Epoch 439/500
5/5 [==============================] - 0s 2ms/step - loss: 178749056.0000
Epoch 440/500
5/5 [==============================] - 0s 1ms/step - loss: 178360688.0000
Epoch 441/500
5/5 [==============================] - 0s 1ms/step - loss: 180422672.0000
Epoch 442/500
5/5 [==============================] - 0s 1ms/step - loss: 178124512.0000
Epoch 443/500
5/5 [==============================] - 0s 1ms/step - loss: 178799312.0000
Epoch 444/500
5/5 [==============================] - 0s 1ms/step - loss: 180591680.0000
Epoch 445/500
5/5 [==============================] - 0s 2ms/step - loss: 178494768.0000
Epoch 446/500
5/5 [==============================] - 0s 2ms/step - loss: 178910288.0000
Epoch 447/500
5/5 [==============================] - 0s 1ms/step - loss: 180862624.0000
Epoch 448/500
5/5 [==============================] - 0s 976us/step - loss: 180173536.0000
Epoch 449/500
5/5 [==============================] - 0s 1ms/step - loss: 179291712.0000
Epoch 450/500
5/5 [==============================] - 0s 1ms/step - loss: 180131568.0000
Epoch 451/500
5/5 [==============================] - 0s 1ms/step - loss: 177993264.0000
Epoch 452/500
5/5 [==============================] - 0s 1ms/step - loss: 177874048.0000
Epoch 453/500
```

```
5/5 [==============================] - 0s 1ms/step - loss: 179080944.0000
Epoch 454/500
5/5 [==============================] - 0s 1ms/step - loss: 178110400.0000
Epoch 455/500
5/5 [==============================] - 0s 1ms/step - loss: 177722560.0000
Epoch 456/500
5/5 [==============================] - 0s 995us/step - loss: 178903360.0000
Epoch 457/500
5/5 [==============================] - 0s 788us/step - loss: 180619616.0000
Epoch 458/500
5/5 [==============================] - 0s 1ms/step - loss: 178920880.0000
Epoch 459/500
5/5 [==============================] - 0s 1ms/step - loss: 179235424.0000
Epoch 460/500
5/5 [==============================] - 0s 1ms/step - loss: 178013056.0000
Epoch 461/500
5/5 [==============================] - 0s 1ms/step - loss: 180330064.0000
Epoch 462/500
5/5 [==============================] - 0s 1ms/step - loss: 177471040.0000
Epoch 463/500
5/5 [==============================] - 0s 1ms/step - loss: 178275744.0000
Epoch 464/500
5/5 [==============================] - 0s 2ms/step - loss: 178119408.0000
Epoch 465/500
5/5 [==============================] - 0s 1ms/step - loss: 180057136.0000
Epoch 466/500
5/5 [==============================] - 0s 2ms/step - loss: 178609152.0000
Epoch 467/500
5/5 [==============================] - 0s 1ms/step - loss: 178437424.0000
Epoch 468/500
5/5 [==============================] - 0s 1ms/step - loss: 177839376.0000
Epoch 469/500
5/5 [==============================] - 0s 1ms/step - loss: 178770432.0000
Epoch 470/500
5/5 [==============================] - 0s 1ms/step - loss: 179040544.0000
Epoch 471/500
5/5 [==============================] - 0s 2ms/step - loss: 178172912.0000
Epoch 472/500
5/5 [==============================] - 0s 1ms/step - loss: 178514704.0000
Epoch 473/500
5/5 [==============================] - 0s 2ms/step - loss: 179794224.0000
Epoch 474/500
5/5 [==============================] - 0s 823us/step - loss: 178080416.0000
Epoch 475/500
5/5 [==============================] - 0s 1ms/step - loss: 178810816.0000
Epoch 476/500
5/5 [==============================] - 0s 2ms/step - loss: 179423008.0000
Epoch 477/500
5/5 [==============================] - 0s 1ms/step - loss: 179819648.0000
Epoch 478/500
5/5 [==============================] - 0s 2ms/step - loss: 178578048.0000
Epoch 479/500
5/5 [==============================] - 0s 2ms/step - loss: 178909936.0000
Epoch 480/500
5/5 [==============================] - 0s 2ms/step - loss: 179891136.0000
Epoch 481/500
5/5 [==============================] - 0s 1ms/step - loss: 179647856.0000
```

```
Epoch 482/500
5/5 [==============================] - 0s 2ms/step - loss: 177472384.0000
Epoch 483/500
5/5 [==============================] - 0s 2ms/step - loss: 178247312.0000
Epoch 484/500
5/5 [==============================] - 0s 2ms/step - loss: 178197152.0000
Epoch 485/500
5/5 [==============================] - 0s 2ms/step - loss: 181724656.0000
Epoch 486/500
5/5 [==============================] - 0s 1ms/step - loss: 178828576.0000
Epoch 487/500
5/5 [==============================] - 0s 1ms/step - loss: 178027104.0000
Epoch 488/500
5/5 [==============================] - 0s 914us/step - loss: 182745296.0000
Epoch 489/500
5/5 [==============================] - 0s 1ms/step - loss: 178162272.0000
Epoch 490/500
5/5 [==============================] - 0s 651us/step - loss: 177530352.0000
Epoch 491/500
5/5 [==============================] - 0s 1ms/step - loss: 178869296.0000
Epoch 492/500
5/5 [==============================] - 0s 928us/step - loss: 178649536.0000
Epoch 493/500
5/5 [==============================] - 0s 1ms/step - loss: 180322176.0000
Epoch 494/500
5/5 [==============================] - 0s 796us/step - loss: 177935792.0000
Epoch 495/500
5/5 [==============================] - 0s 1ms/step - loss: 179142160.0000
Epoch 496/500
5/5 [==============================] - 0s 883us/step - loss: 179705248.0000
Epoch 497/500
5/5 [==============================] - 0s 2ms/step - loss: 179010288.0000
Epoch 498/500
5/5 [==============================] - 0s 833us/step - loss: 178186656.0000
Epoch 499/500
5/5 [==============================] - 0s 2ms/step - loss: 179835024.0000
Epoch 500/500
5/5 [==============================] - 0s 962us/step - loss: 179253024.0000
```

Out[19]:

```
<tensorflow.python.keras.callbacks.History at 0x1a48ec84400>
```

Predicting the output

In [26]:
```
y_pred=model.predict(x)
y_pred
```

Out[26]:
```
array([[201475.5  ],
       [201956.5  ],
       [176081.72 ],
       [173299.45 ],
       [161384.47 ],
       [156542.64 ],
       [154832.58 ],
       [167158.97 ],
       [160220.03 ],
       [148604.34 ],
       [127725.39 ],
       [122370.61 ],
       [129103.75 ],
       [130658.734],
       [157860.12 ],
       [143335.84 ],
       [117063.34 ],
       [138134.33 ],
       [126966.82 ],
       [112000.086],
       [116072.58 ],
       [130720.96 ],
       [117746.81 ],
       [107678.516],
       [ 99021.94 ],
       [103084.016],
       [111900.56 ],
       [122114.51 ],
       [116533.69 ],
       [105655.805],
       [ 89560.2  ],
       [100808.74 ],
       [ 91336.9  ],
       [ 90846.266],
       [101871.63 ],
       [ 77441.28 ],
       [ 78369.47 ],
       [ 64331.477],
       [ 51097.094],
       [ 68939.49 ],
       [ 73348.4  ],
       [ 61013.516],
       [ 60372.59 ],
       [ 55585.297],
       [ 68721.766],
       [ 41408.848],
       [ 62927.965],
       [ 44211.203],
       [ 17290.967],
       [ 41866.48 ]], dtype=float32)
```

In [27]:
```
y.shape
```

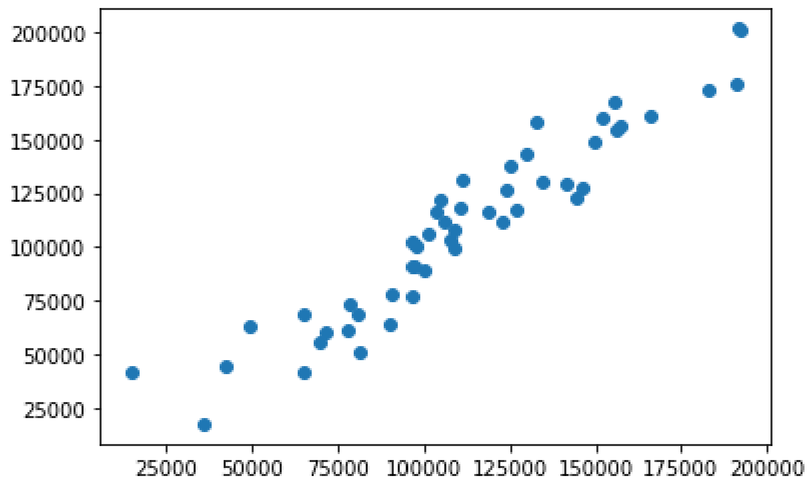
Out[27]:
```
(50, 1)
```

In [28]:
```
y_pred.shape
```

Out[28]:
```
(50, 1)
```

In [29]:
```
plt.scatter(y,y_pred)
```

Out[29]:
```
<matplotlib.collections.PathCollection at 0x1a48ef6a8e0>
```



In [ ]: