Exploratory Data Analysis

In [7]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df = pd.read_csv('./data/DATA/kc_house_data.csv')
```

In [3]:
```
df.isnull().sum()
```

Out[3]:
```
id               0
date             0
price            0
bedrooms         0
bathrooms        0
sqft_living      0
sqft_lot         0
floors           0
waterfront       0
view             0
condition        0
grade            0
sqft_above       0
sqft_basement    0
yr_built         0
yr_renovated     0
zipcode          0
lat              0
long             0
sqft_living15    0
sqft_lot15       0
dtype: int64
```

In [7]:
```
df.describe().transpose()
```

Out[7]:

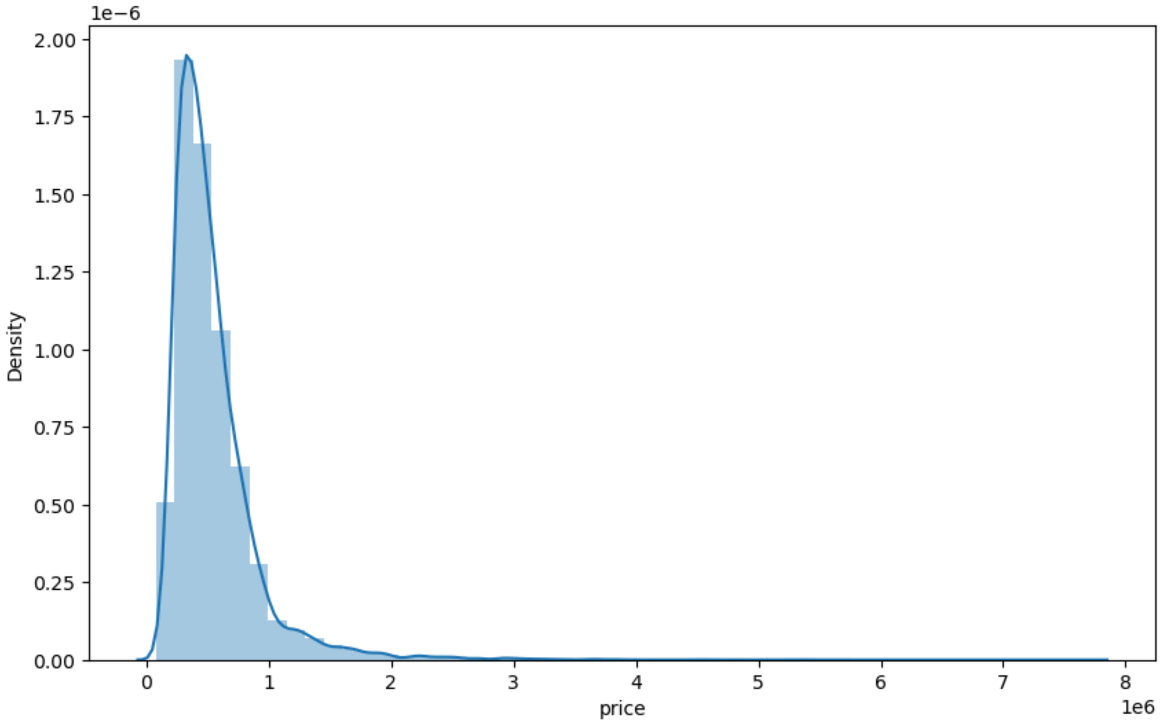
	count	mean	std	min	25%	
id	21597.0	4.580474e+09	2.876736e+09	1.000102e+06	2.123049e+09	3.
price	21597.0	5.402966e+05	3.673681e+05	7.800000e+04	3.220000e+05	4.
bedrooms	21597.0	3.373200e+00	9.262989e-01	1.000000e+00	3.000000e+00	3.
bathrooms	21597.0	2.115826e+00	7.689843e-01	5.000000e-01	1.750000e+00	2.
sqft_living	21597.0	2.080322e+03	9.181061e+02	3.700000e+02	1.430000e+03	1.
sqft_lot	21597.0	1.509941e+04	4.141264e+04	5.200000e+02	5.040000e+03	7.
floors	21597.0	1.494096e+00	5.396828e-01	1.000000e+00	1.000000e+00	1.
waterfront	21597.0	7.547345e-03	8.654900e-02	0.000000e+00	0.000000e+00	0.
view	21597.0	2.342918e-01	7.663898e-01	0.000000e+00	0.000000e+00	0.
condition	21597.0	3.409825e+00	6.505456e-01	1.000000e+00	3.000000e+00	3.
grade	21597.0	7.657915e+00	1.173200e+00	3.000000e+00	7.000000e+00	7.
sqft_above	21597.0	1.788597e+03	8.277598e+02	3.700000e+02	1.190000e+03	1.
sqft_basement	21597.0	2.917250e+02	4.426678e+02	0.000000e+00	0.000000e+00	0.
yr_built	21597.0	1.971000e+03	2.937523e+01	1.900000e+03	1.951000e+03	1.
yr_renovated	21597.0	8.446479e+01	4.018214e+02	0.000000e+00	0.000000e+00	0.
zipcode	21597.0	9.807795e+04	5.351307e+01	9.800100e+04	9.803300e+04	9.
lat	21597.0	4.756009e+01	1.385518e-01	4.715590e+01	4.747110e+01	4.
long	21597.0	-1.222140e+02	1.407235e-01	-1.225190e+02	-1.223280e+02	-1.
sqft_living15	21597.0	1.986620e+03	6.852305e+02	3.990000e+02	1.490000e+03	1.
sqft_lot15	21597.0	1.275828e+04	2.727444e+04	6.510000e+02	5.100000e+03	7.

In [9]:

```
plt.figure(figsize=(10,6))
sns.distplot(df['price'])
```

```
C:\Users\AMIT_MERUGU\AppData\Local\Temp\1\ipykernel_39744\4141105712.py:2: UserWa
rning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df['price'])
```

Out[9]: <Axes: xlabel='price', ylabel='Density'>



In [8]:
```
#The above chart shows most of the house prices fall under $2M;
```

In [81]:
```
sns.countplot(df['bedrooms'])
```

```
---------------------------------------------------------------------------
KeyboardInterrupt                         Traceback (most recent call last)
~\AppData\Local\Temp\1\ipykernel_18900\2996807382.py in ?()
----> 1 sns.countplot(df['bedrooms'])

C:\learnings\Lib\site-packages\seaborn\categorical.py in ?(data, x, y, hue, orde
r, hue_order, orient, color, palette, saturation, fill, hue_norm, stat, width, do
dge, gap, log_scale, native_scale, formatter, legend, ax, **kwargs)
   2671         p.plot_data[count_axis] /= len(p.plot_data) / denom
   2672 
   2673     aggregator = EstimateAggregator("sum", errorbar=None)
   2674 
-> 2675     p.plot_bars(
   2676         aggregator=aggregator,
   2677         dodge=dodge,
   2678         width=width,

C:\learnings\Lib\site-packages\seaborn\categorical.py in ?(self, aggregator, dodg
e, gap, width, fill, color, capsize, err_kws, plot_kws)
   1276 
   1277             ax = self._get_axes(sub_vars)
   1278 
   1279             agg_data = sub_data if sub_data.empty else (
-> 1280                 sub_data
   1281                 .groupby(self.orient)
   1282                 .apply(aggregator, agg_var, **groupby_apply_include_group
s(False))
   1283                 .reset_index()

C:\learnings\Lib\site-packages\pandas\core\groupby\groupby.py in ?(self, func, in
clude_groups, *args, **kwargs)
   1815         else:
   1816             f = func
   1817 
   1818         if not include_groups:
-> 1819             return self._python_apply_general(f, self._obj_with_exclusion
s)
   1820 
   1821         # ignore SettingWithCopy here in case the user mutates
   1822         with option_context("mode.chained_assignment", None):

C:\learnings\Lib\site-packages\pandas\core\groupby\groupby.py in ?(self, f, data,
not_indexed_same, is_transform, is_agg)
   1885         values, mutated = self._grouper.apply_groupwise(f, data, self.axi
s)
   1886         if not_indexed_same is None:
   1887             not_indexed_same = mutated
   1888 
-> 1889         return self._wrap_applied_output(
   1890             data,
   1891             values,
   1892             not_indexed_same,

C:\learnings\Lib\site-packages\pandas\core\groupby\generic.py in ?(self, data, va
lues, not_indexed_same, is_transform)
   1616                 result = self._insert_inaxis_grouper(result)
   1617                 return result
   1618         else:
   1619             # values are Series
-> 1620             return self._wrap_applied_output_series(
```

```
   1621                    values,
   1622                    not_indexed_same,
   1623                    first_not_none,

C:\learnings\Lib\site-packages\pandas\core\groupby\generic.py in ?(self, values,
not_indexed_same, first_not_none, key_index, is_transform)
   1648                )
   1649
   1650            # Combine values
   1651            # vstack+constructor is faster than concat and handles MI-columns
-> 1652            stacked_values = np.vstack([np.asarray(v) for v in values])
   1653
   1654            if self.axis == 0:
   1655                index = key_index

C:\learnings\Lib\site-packages\pandas\core\generic.py in ?(self, name)
   6292            if (
   6293                name not in self._internal_names_set
   6294                and name not in self._metadata
   6295                and name not in self._accessors
-> 6296                and self._info_axis._can_hold_identifiers_and_holds_name(nam
e)
   6297            ):
   6298                return self[name]
   6299            return object.__getattribute__(self, name)

C:\learnings\Lib\site-packages\pandas\core\generic.py in ?(self)
--> 667     @final
    668     @property
    669     def _info_axis(self) -> Index:
    670         return getattr(self, self._info_axis_name)

KeyboardInterrupt:
Error in callback <function _draw_all_if_interactive at 0x000001AFA753AA20> (for
post_execute), with arguments args (),kwargs {}:

KeyboardInterrupt

Error in callback <function flush_figures at 0x000001AFB203CF40> (for post_execut
e), with arguments args (),kwargs {}:

KeyboardInterrupt
```

In [11]:

```
df.describe()
```

Out[11]:

	id	price	bedrooms	bathrooms	sqft_living	sqf
count	2.159700e+04	2.159700e+04	21597.000000	21597.000000	21597.000000	2.159700
mean	4.580474e+09	5.402966e+05	3.373200	2.115826	2080.321850	1.509941
std	2.876736e+09	3.673681e+05	0.926299	0.768984	918.106125	4.141264
min	1.000102e+06	7.800000e+04	1.000000	0.500000	370.000000	5.200000
25%	2.123049e+09	3.220000e+05	3.000000	1.750000	1430.000000	5.040000
50%	3.904930e+09	4.500000e+05	3.000000	2.250000	1910.000000	7.618000
75%	7.308900e+09	6.450000e+05	4.000000	2.500000	2550.000000	1.068500
max	9.900000e+09	7.700000e+06	33.000000	8.000000	13540.000000	1.651359

In [13]:

```
df.corr()['price'].sort_values()
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[13], line 1
----> 1 df.corr()['price'].sort_values()

File C:\learnings\Lib\site-packages\pandas\core\frame.py:11049, in DataFrame.corr
(self, method, min_periods, numeric_only)
  11047 cols = data.columns
  11048 idx = cols.copy()
> 11049 mat = data.to_numpy(dtype=float, na_value=np.nan, copy=False)
  11051 if method == "pearson":
  11052     correl = libalgos.nancorr(mat, minp=min_periods)

File C:\learnings\Lib\site-packages\pandas\core\frame.py:1993, in DataFrame.to_nu
mpy(self, dtype, copy, na_value)
   1991 if dtype is not None:
   1992     dtype = np.dtype(dtype)
-> 1993 result = self._mgr.as_array(dtype=dtype, copy=copy, na_value=na_value)
   1994 if result.dtype is not dtype:
   1995     result = np.asarray(result, dtype=dtype)

File C:\learnings\Lib\site-packages\pandas\core\internals\managers.py:1694, in Bl
ockManager.as_array(self, dtype, copy, na_value)
   1692         arr.flags.writeable = False
   1693 else:
-> 1694     arr = self._interleave(dtype=dtype, na_value=na_value)
   1695     # The underlying data was copied within _interleave, so no need
   1696     # to further copy if copy=True or setting na_value
   1698 if na_value is lib.no_default:

File C:\learnings\Lib\site-packages\pandas\core\internals\managers.py:1753, in Bl
ockManager._interleave(self, dtype, na_value)
   1751     else:
   1752         arr = blk.get_values(dtype)
-> 1753     result[rl.indexer] = arr
   1754     itemmask[rl.indexer] = 1
   1756 if not itemmask.all():

ValueError: could not convert string to float: '10/13/2014'
```

In [57]:
```python
print(df['price'].dtype)
```

```
float64
```

In [59]:
```python
# Try to convert the column to numeric, and find rows where this fails
non_numeric = df[pd.to_numeric(df['price'], errors='coerce').isnull()]

print(non_numeric)
```

```
Empty DataFrame
Columns: [id, date, price, bedrooms, bathrooms, sqft_living, sqft_lot, floors, wa
terfront, view, condition, grade, sqft_above, sqft_basement, yr_built, yr_renovat
ed, zipcode, lat, long, sqft_living15, sqft_lot15]
Index: []

[0 rows x 21 columns]
```

In [61]:
```python
print(df['price'].head(10))
```

```
0     221900.0
1     538000.0
2     180000.0
3     604000.0
4     510000.0
5    1230000.0
6     257500.0
7     291850.0
8     229500.0
9     323000.0
Name: price, dtype: float64
```

In [71]:
```python
df.head()
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[71], line 1
----> 1 df.head()

AttributeError: 'NoneType' object has no attribute 'head'
```

In [15]:
```python
df = df.drop('date', axis=1)
```

In [17]:
```python
df.head()
```

Out[17]:

	id	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront
0	7129300520	221900.0	3	1.00	1180	5650	1.0	(
1	6414100192	538000.0	3	2.25	2570	7242	2.0	(
2	5631500400	180000.0	2	1.00	770	10000	1.0	(
3	2487200875	604000.0	4	3.00	1960	5000	1.0	(
4	1954400510	510000.0	3	2.00	1680	8080	1.0	(

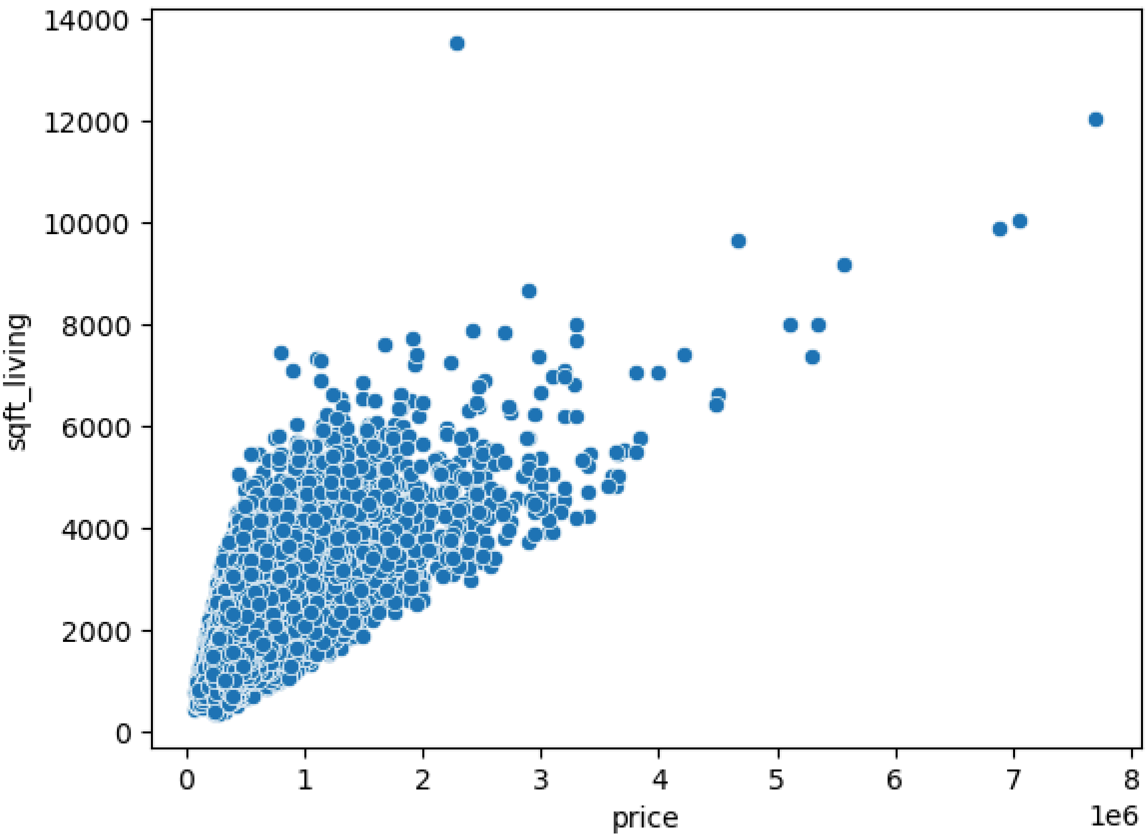
In [19]:
```python
df.corr()['price'].sort_values()
```

Out[19]:
```
zipcode         -0.053402
id              -0.016772
long             0.022036
condition        0.036056
yr_built         0.053953
sqft_lot15       0.082845
sqft_lot         0.089876
yr_renovated     0.126424
floors           0.256804
waterfront       0.266398
lat              0.306692
bedrooms         0.308787
sqft_basement    0.323799
view             0.397370
bathrooms        0.525906
sqft_living15    0.585241
sqft_above       0.605368
grade            0.667951
sqft_living      0.701917
price            1.000000
Name: price, dtype: float64
```

In [107…
```
#sqft_living has very high correlation to the price; Let's explore what are the
```

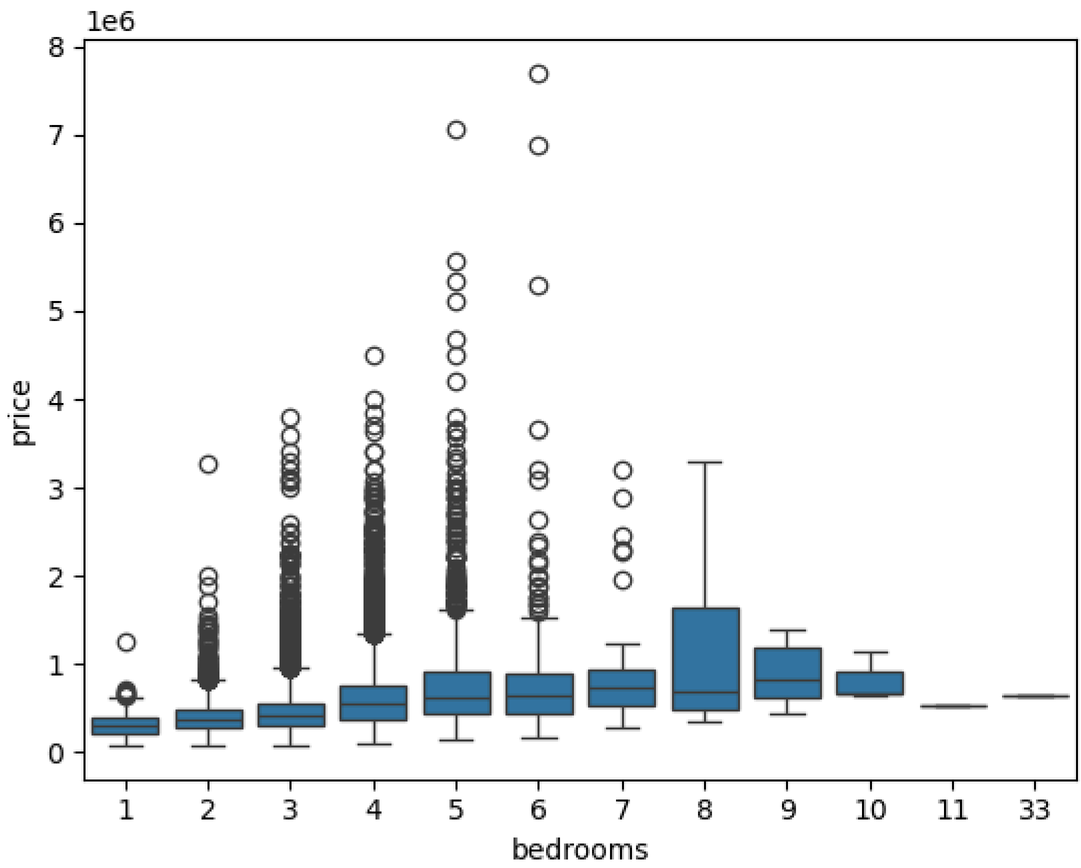
In [21]:
```
sns.scatterplot(x='price', y='sqft_living', data=df)
```

Out[21]: <Axes: xlabel='price', ylabel='sqft_living'>



In [23]:
```
sns.boxplot(x='bedrooms', y='price', data=df)
```

Out[23]: <Axes: xlabel='bedrooms', ylabel='price'>

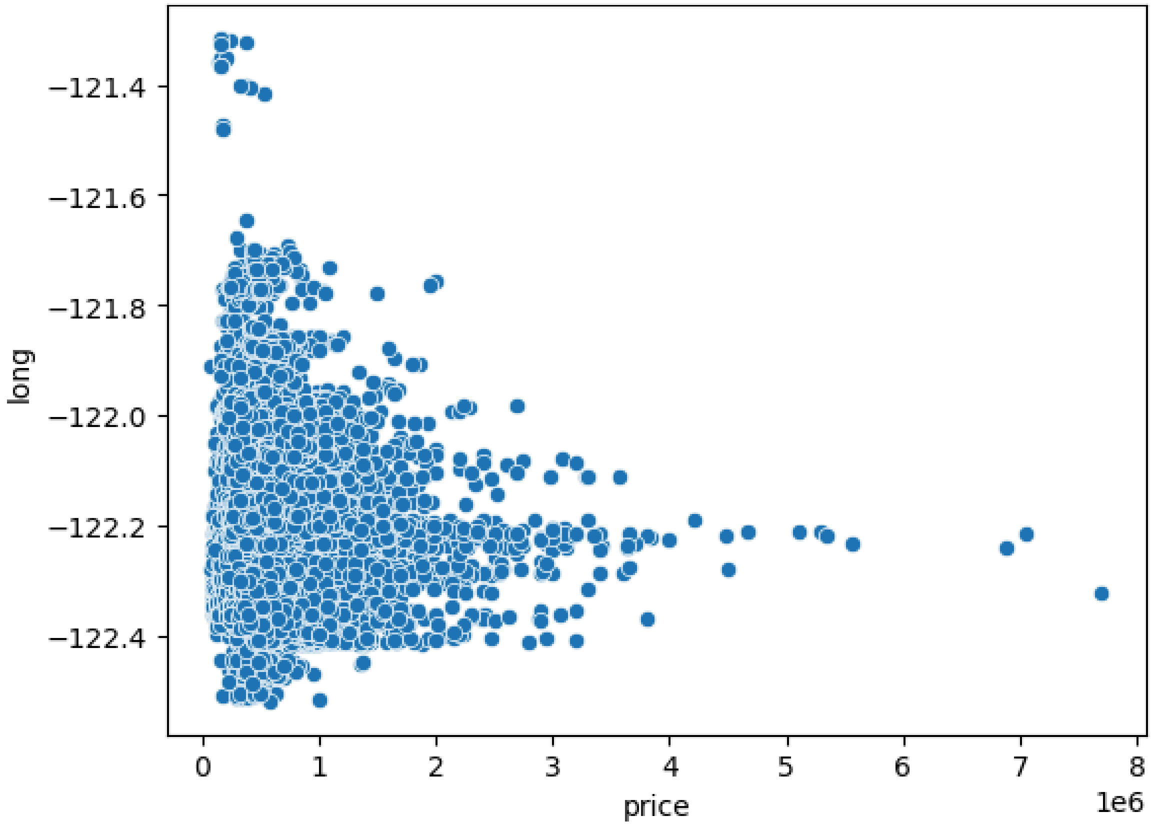


In [25]:
```
df.columns
```

Out[25]:
```
Index(['id', 'price', 'bedrooms', 'bathrooms', 'sqft_living', 'sqft_lot',
       'floors', 'waterfront', 'view', 'condition', 'grade', 'sqft_above',
       'sqft_basement', 'yr_built', 'yr_renovated', 'zipcode', 'lat', 'long',
       'sqft_living15', 'sqft_lot15'],
      dtype='object')
```

In [27]:
```
sns.scatterplot(x='price', y='long', data=df)
```

Out[27]:
```
<Axes: xlabel='price', ylabel='long'>
```

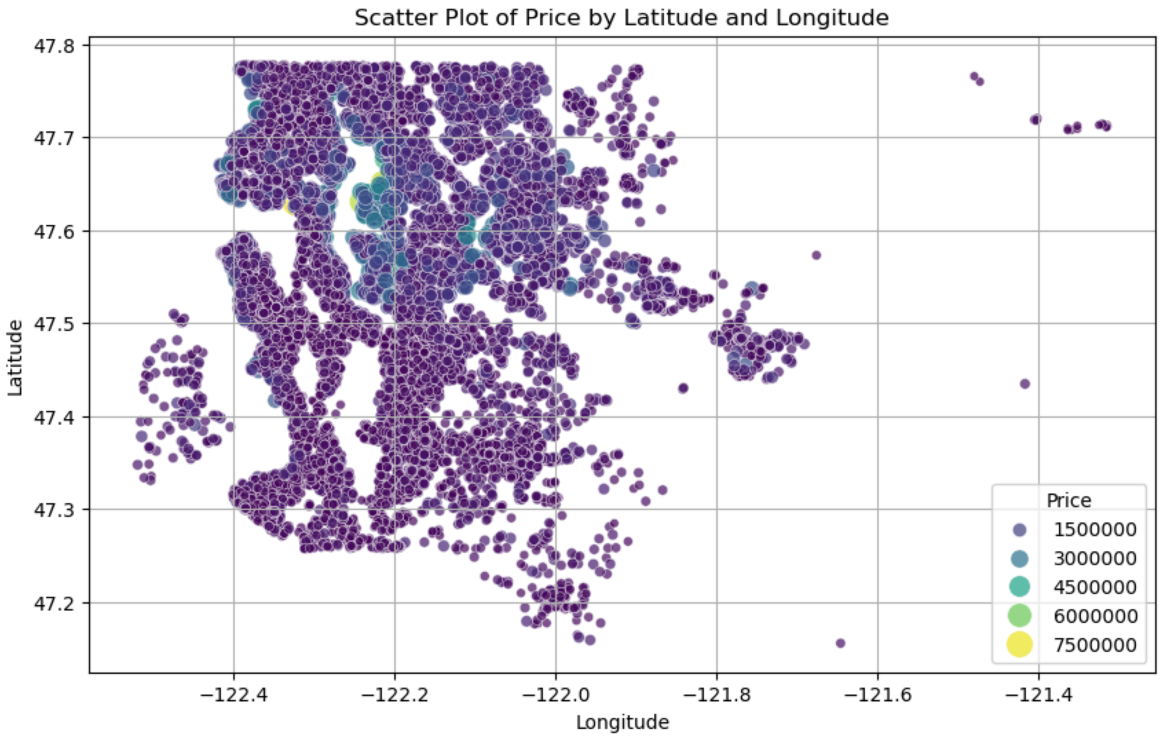


In [117…

```
plt.figure(figsize=(10, 6))
sns.scatterplot(data=df, x='long', y='lat', hue='price',palette='viridis', size=
plt.title('Scatter Plot of Price by Latitude and Longitude')
plt.xlabel('Longitude')
plt.ylabel('Latitude')
plt.grid()
plt.legend(title='Price')
```

Out[117…

```
<matplotlib.legend.Legend at 0x1afc5254da0>
```



In [31]:

```
df.sort_values('price', ascending=False).head(20)
```

Out[31]:

	id	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	wate
7245	6762700020	7700000.0	6	8.00	12050	27600	2.5	
3910	9808700762	7060000.0	5	4.50	10040	37325	2.0	
9245	9208900037	6890000.0	6	7.75	9890	31374	2.0	
4407	2470100110	5570000.0	5	5.75	9200	35069	2.0	
1446	8907500070	5350000.0	5	5.00	8000	23985	2.0	
1313	7558700030	5300000.0	6	6.00	7390	24829	2.0	
1162	1247600105	5110000.0	5	5.25	8010	45517	2.0	
8085	1924059029	4670000.0	5	6.75	9640	13068	1.0	
2624	7738500731	4500000.0	5	5.50	6640	40014	2.0	
8629	3835500195	4490000.0	4	3.00	6430	27517	2.0	
12358	6065300370	4210000.0	5	6.00	7440	21540	2.0	
4145	6447300265	4000000.0	4	5.50	7080	16573	2.0	
2083	8106100105	3850000.0	4	4.25	5770	21300	2.0	
7028	853200010	3800000.0	5	5.50	7050	42840	1.0	
19002	2303900100	3800000.0	3	4.25	5510	35000	2.0	
16288	7397300170	3710000.0	4	3.50	5550	28078	2.0	
18467	4389201095	3650000.0	5	3.75	5020	8694	2.0	
6502	4217402115	3650000.0	6	4.75	5480	19401	1.5	
15241	2425049063	3640000.0	4	3.25	4830	22257	2.0	
19133	3625049042	3640000.0	5	6.00	5490	19897	2.0	

In [35]:

```
len(df)*0.01
```

Out[35]: 215.97

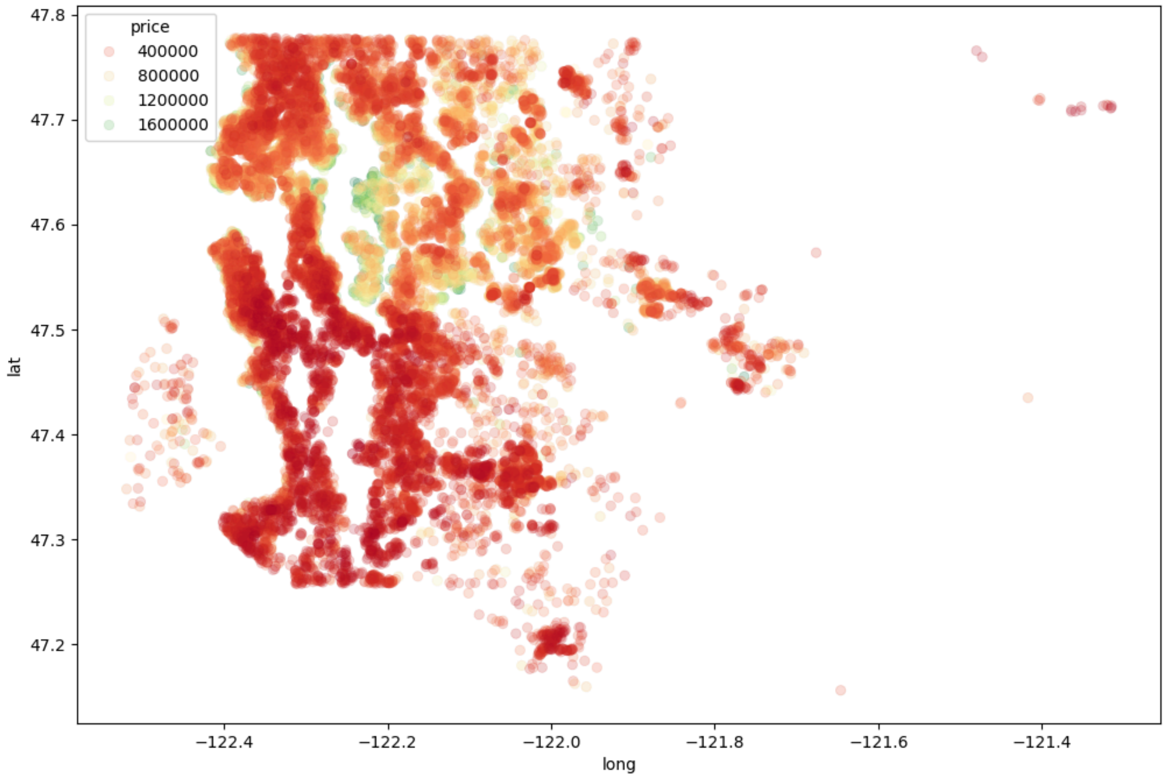
In [37]:

```
# let's drop bottom 1% which are not densed
non_top_1_perc = df.sort_values('price', ascending=False).iloc[216:]
```

In [43]:

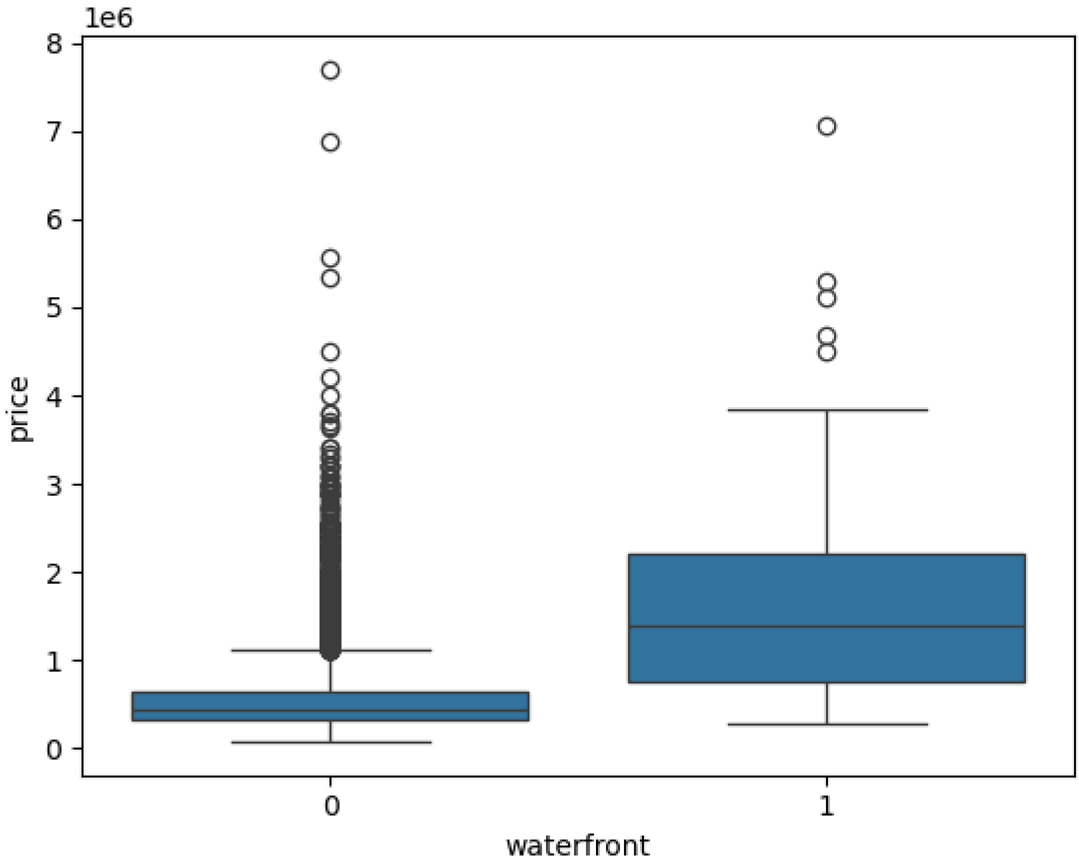
```
plt.figure(figsize=(12,8))
sns.scatterplot(x='long', y='lat', data=non_top_1_perc, edgecolor=None, alpha=0.
```

Out[43]: <Axes: xlabel='long', ylabel='lat'>



In [45]:
```
sns.boxplot(x='waterfront', y='price', data=df)
```

Out[45]: <Axes: xlabel='waterfront', ylabel='price'>



In [47]:
```
#The above chart show if you are on waterfront; you house is more likely expensi
```

In [49]:
```
df.head()
```

Out[49]:

	id	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront
0	7129300520	221900.0	3	1.00	1180	5650	1.0	(
1	6414100192	538000.0	3	2.25	2570	7242	2.0	(
2	5631500400	180000.0	2	1.00	770	10000	1.0	(
3	2487200875	604000.0	4	3.00	1960	5000	1.0	(
4	1954400510	510000.0	3	2.00	1680	8080	1.0	(

In [53]:
```
#Let's remove the not used features from the dataset; for example id is not used
```

In [8]:
```
df = pd.read_csv('./data/DATA/kc_house_data.csv')
```

In [9]:
```
df.head()
```

Out[9]:

	id	date	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors
0	7129300520	10/13/2014	221900.0	3	1.00	1180	5650	1.(
1	6414100192	12/9/2014	538000.0	3	2.25	2570	7242	2.(
2	5631500400	2/25/2015	180000.0	2	1.00	770	10000	1.(
3	2487200875	12/9/2014	604000.0	4	3.00	1960	5000	1.(
4	1954400510	2/18/2015	510000.0	3	2.00	1680	8080	1.(

In [10]:
```
df = df.drop('id', axis=1)
```

In [11]:
```
df['date']
```

Out[11]:
```
0        10/13/2014
1         12/9/2014
2         2/25/2015
3         12/9/2014
4         2/18/2015
            ...
21592     5/21/2014
21593     2/23/2015
21594     6/23/2014
21595     1/16/2015
21596    10/15/2014
Name: date, Length: 21597, dtype: object
```

In [12]:
```
df['date'] = pd.to_datetime(df['date'])
```

In [13]:
```
df['date']
```

Out[13]:
```
0        2014-10-13
1        2014-12-09
2        2015-02-25
3        2014-12-09
4        2015-02-18
            ...
21592    2014-05-21
21593    2015-02-23
21594    2014-06-23
21595    2015-01-16
21596    2014-10-15
Name: date, Length: 21597, dtype: datetime64[ns]
```

In [14]:
```
df['year'] = df['date'].apply(lambda date: date.year)
df['month'] = df['date'].apply(lambda date: date.month)
```

In [15]:
```
df.head()
```

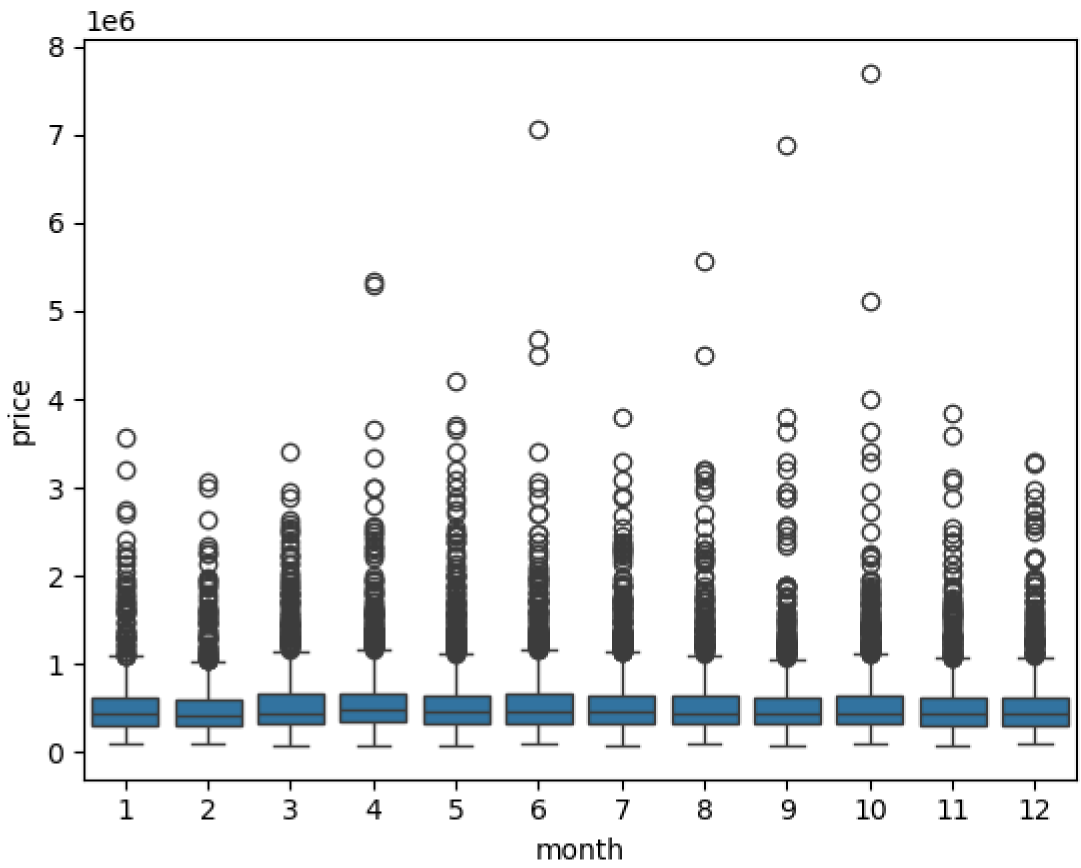
Out[15]:

	date	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	vie
0	2014-10-13	221900.0	3	1.00	1180	5650	1.0	0	
1	2014-12-09	538000.0	3	2.25	2570	7242	2.0	0	
2	2015-02-25	180000.0	2	1.00	770	10000	1.0	0	
3	2014-12-09	604000.0	4	3.00	1960	5000	1.0	0	
4	2015-02-18	510000.0	3	2.00	1680	8080	1.0	0	

In [77]:
```
#Let's explore if months column have impact on house prices
```

In [16]:
```
sns.boxplot(x='month', y='price', data=df)
```

Out[16]: <Axes: xlabel='month', ylabel='price'>

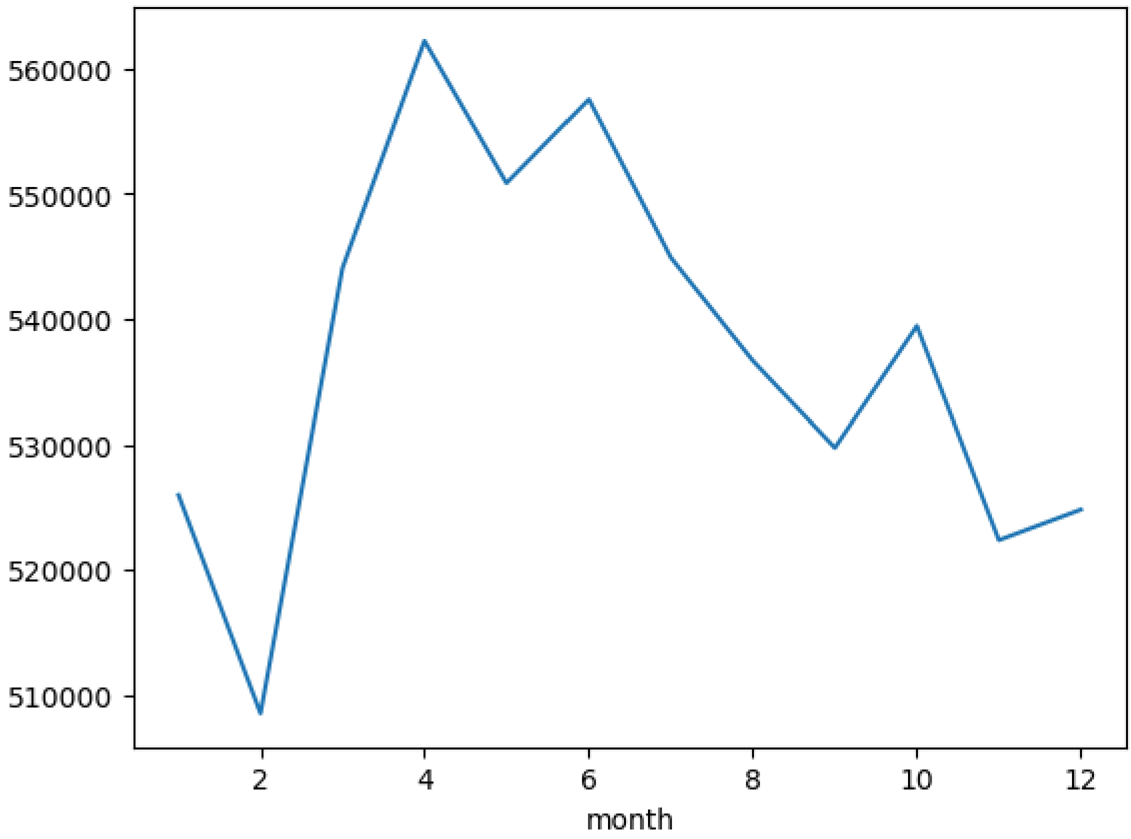


In [17]:
```
df.groupby('month').mean()['price']
```

Out[17]:
```
month
1     525963.251534
2     508520.051323
3     544057.683200
4     562215.615074
5     550849.746893
6     557534.318182
7     544892.161013
8     536655.212481
9     529723.517787
10    539439.447228
11    522359.903478
12    524799.902041
Name: price, dtype: float64
```

In [18]:
```
df.groupby('month').mean()['price'].plot()
```

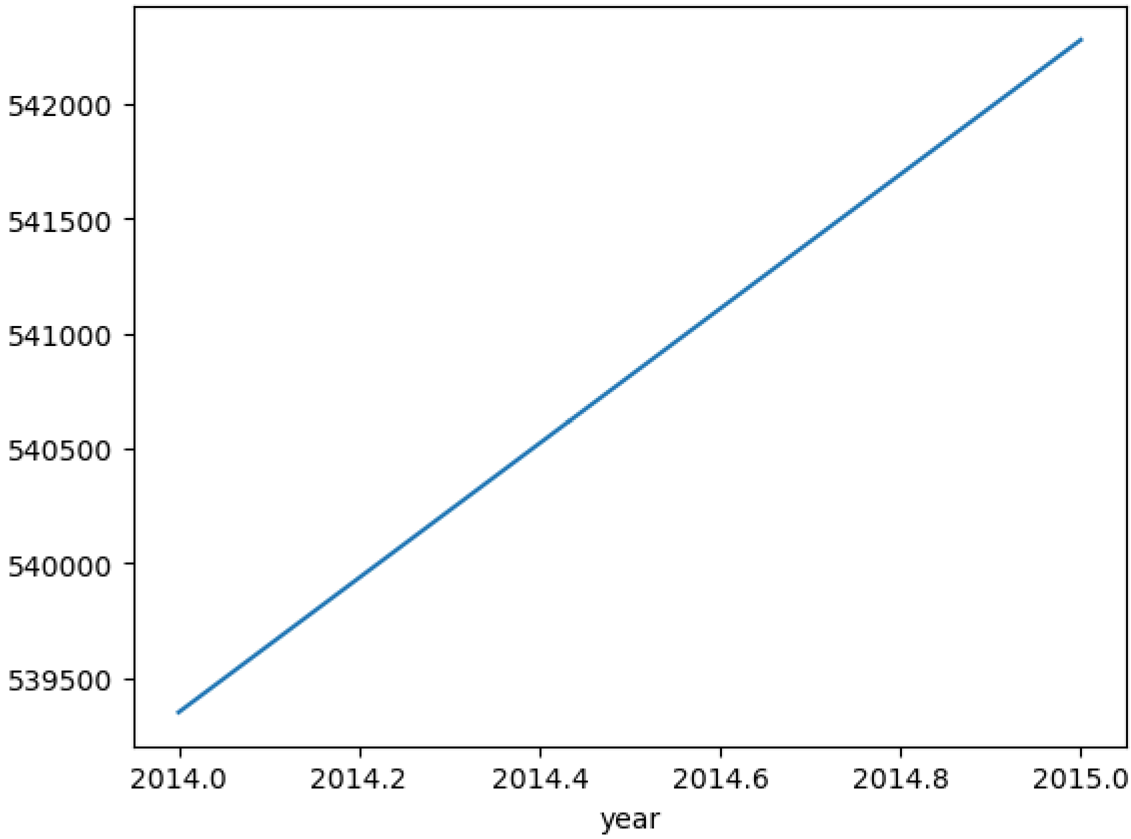
Out[18]:
```
<Axes: xlabel='month'>
```



In [85]:
```
#Looks like some difference in price particularly in months from mar to jun; cou
```

In [19]:
```
df.groupby('year').mean()['price'].plot()
```

Out[19]: <Axes: xlabel='year'>



In [20]:
```
df = df.drop('date', axis=1)
```

In [21]:
```
df.head()
```

Out[21]:

	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	conc
0	221900.0	3	1.00	1180	5650	1.0	0	0	
1	538000.0	3	2.25	2570	7242	2.0	0	0	
2	180000.0	2	1.00	770	10000	1.0	0	0	
3	604000.0	4	3.00	1960	5000	1.0	0	0	
4	510000.0	3	2.00	1680	8080	1.0	0	0	

In [22]:
```
df['zipcode'].value_counts()
```

Out[22]:
```
zipcode
98103    602
98038    589
98115    583
98052    574
98117    553
        ... 
98102    104
98010    100
98024     80
98148     57
98039     50
Name: count, Length: 70, dtype: int64
```

In [95]:
```
#Looks like we have 70 unique zipcodes
```

In [23]:
```
df = df.drop('zipcode', axis=1)
```

In [24]:
```
df['yr_renovated'].value_counts()
```

Out[24]:
```
yr_renovated
0        20683
2014        91
2013        37
2003        36
2005        35
        ... 
1951         1
1959         1
1948         1
1954         1
1944         1
Name: count, Length: 70, dtype: int64
```

In [25]:
```
df['sqft_basement'].value_counts()
```

Out[25]:
```
sqft_basement
0      13110
600      221
700      218
500      214
800      206
       ...
518        1
374        1
784        1
906        1
248        1
Name: count, Length: 306, dtype: int64
```

Data Processing and Creating a Model

In [26]:
```
X = df.drop('price', axis=1)
y = df['price'].values
```

In [27]:
```
from sklearn.model_selection import train_test_split
```

In [28]:
```
X_train, X_test, y_train, y_test = train_test_split( X, y, test_size=0.3, random
```

In [29]:
```
from sklearn.preprocessing import MinMaxScaler
```

In [30]:
```
scaler = MinMaxScaler()
```

In [31]:
```
X_train = scaler.fit_transform(X_train)
```

In [32]:
```
X_test = scaler.transform(X_test)
```

In [33]:
```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
```

In [34]:
```
X_train.shape
```

Out[34]:
```
(15117, 19)
```

In [35]:
```
#Looks like we have 19 incoming features; we can have 19 neurons in our model
```

In [36]:
```
model = Sequential()
```

In [37]:
```
model.add(Dense(19, activation='relu'))
model.add(Dense(19, activation='relu'))
model.add(Dense(19, activation='relu'))
model.add(Dense(19, activation='relu'))

model.add(Dense(1))
model.compile(optimizer='adam', loss='mse')
```

In [39]:
```
#we are training with X_train and Y_train as we are going we are testing with ou
model.fit(x=X_train, y= y_train, validation_data=(X_test, y_test), batch_size=12
```

```
Epoch 1/400
119/119 [==============================] - 2s 7ms/step - loss: 430233550848.0000
- val_loss: 418869116928.0000
Epoch 2/400
119/119 [==============================] - 1s 5ms/step - loss: 428280905728.0000
- val_loss: 412023783424.0000
Epoch 3/400
119/119 [==============================] - 1s 5ms/step - loss: 401275650048.0000
- val_loss: 351211945984.0000
Epoch 4/400
119/119 [==============================] - 1s 5ms/step - loss: 283478917120.0000
- val_loss: 182568239104.0000
Epoch 5/400
119/119 [==============================] - 1s 6ms/step - loss: 129864892416.0000
- val_loss: 96513089536.0000
Epoch 6/400
119/119 [==============================] - 1s 5ms/step - loss: 98025529344.0000 -
val_loss: 93865385984.0000
Epoch 7/400
119/119 [==============================] - 1s 7ms/step - loss: 95982641152.0000 -
val_loss: 92092260352.0000
Epoch 8/400
119/119 [==============================] - 1s 7ms/step - loss: 94113857536.0000 -
val_loss: 90259668992.0000
Epoch 9/400
119/119 [==============================] - 1s 7ms/step - loss: 92211568640.0000 -
val_loss: 88486961152.0000
Epoch 10/400
119/119 [==============================] - 1s 6ms/step - loss: 90232201216.0000 -
val_loss: 86527778816.0000
Epoch 11/400
119/119 [==============================] - 1s 6ms/step - loss: 88217141248.0000 -
val_loss: 84556652544.0000
Epoch 12/400
119/119 [==============================] - 1s 6ms/step - loss: 86147530752.0000 -
val_loss: 82518138880.0000
Epoch 13/400
119/119 [==============================] - 1s 9ms/step - loss: 83962077184.0000 -
val_loss: 80397647872.0000
Epoch 14/400
119/119 [==============================] - 1s 6ms/step - loss: 81723834368.0000 -
val_loss: 78200586240.0000
Epoch 15/400
119/119 [==============================] - 1s 6ms/step - loss: 79345459200.0000 -
val_loss: 75886772224.0000
Epoch 16/400
119/119 [==============================] - 1s 7ms/step - loss: 76894633984.0000 -
val_loss: 73466527744.0000
Epoch 17/400
119/119 [==============================] - 1s 6ms/step - loss: 74314358784.0000 -
val_loss: 70919774208.0000
Epoch 18/400
119/119 [==============================] - 1s 7ms/step - loss: 71641260032.0000 -
val_loss: 68452839424.0000
Epoch 19/400
119/119 [==============================] - 1s 6ms/step - loss: 68948508672.0000 -
val_loss: 65737445376.0000
Epoch 20/400
119/119 [==============================] - 1s 7ms/step - loss: 66247528448.0000 -
val_loss: 63151091712.0000
```

```
Epoch 21/400
119/119 [==============================] - 1s 5ms/step - loss: 63537614848.0000 -
val_loss: 60591603712.0000
Epoch 22/400
119/119 [==============================] - 1s 5ms/step - loss: 61047984128.0000 -
val_loss: 58286465024.0000
Epoch 23/400
119/119 [==============================] - 1s 6ms/step - loss: 58764214272.0000 -
val_loss: 56192286720.0000
Epoch 24/400
119/119 [==============================] - 1s 6ms/step - loss: 56733474816.0000 -
val_loss: 54369271808.0000
Epoch 25/400
119/119 [==============================] - 1s 6ms/step - loss: 55036293120.0000 -
val_loss: 52908310528.0000
Epoch 26/400
119/119 [==============================] - 1s 7ms/step - loss: 53569888256.0000 -
val_loss: 51597168640.0000
Epoch 27/400
119/119 [==============================] - 1s 5ms/step - loss: 52377931776.0000 -
val_loss: 50562203648.0000
Epoch 28/400
119/119 [==============================] - 1s 6ms/step - loss: 51364610048.0000 -
val_loss: 49722724352.0000
Epoch 29/400
119/119 [==============================] - 1s 9ms/step - loss: 50528419840.0000 -
val_loss: 48927887360.0000
Epoch 30/400
119/119 [==============================] - 1s 7ms/step - loss: 49804398592.0000 -
val_loss: 48401408000.0000
Epoch 31/400
119/119 [==============================] - 1s 7ms/step - loss: 49166233600.0000 -
val_loss: 47686627328.0000
Epoch 32/400
119/119 [==============================] - 1s 7ms/step - loss: 48558309376.0000 -
val_loss: 47198801920.0000
Epoch 33/400
119/119 [==============================] - 1s 7ms/step - loss: 48002719744.0000 -
val_loss: 46709616640.0000
Epoch 34/400
119/119 [==============================] - 1s 7ms/step - loss: 47544434688.0000 -
val_loss: 46209531904.0000
Epoch 35/400
119/119 [==============================] - 1s 7ms/step - loss: 47082311680.0000 -
val_loss: 45769699328.0000
Epoch 36/400
119/119 [==============================] - 1s 7ms/step - loss: 46627479552.0000 -
val_loss: 45325733888.0000
Epoch 37/400
119/119 [==============================] - 1s 6ms/step - loss: 46215032832.0000 -
val_loss: 44977508352.0000
Epoch 38/400
119/119 [==============================] - 1s 5ms/step - loss: 45709729792.0000 -
val_loss: 44487622656.0000
Epoch 39/400
119/119 [==============================] - 1s 6ms/step - loss: 45307908096.0000 -
val_loss: 44100378624.0000
Epoch 40/400
119/119 [==============================] - 1s 6ms/step - loss: 44885749760.0000 -
val_loss: 43615334400.0000
```

```
Epoch 41/400
119/119 [==============================] - 1s 7ms/step - loss: 44523466752.0000 -
val_loss: 43222396928.0000
Epoch 42/400
119/119 [==============================] - 1s 6ms/step - loss: 44099260416.0000 -
val_loss: 42852786176.0000
Epoch 43/400
119/119 [==============================] - 1s 7ms/step - loss: 43746566144.0000 -
val_loss: 42462482432.0000
Epoch 44/400
119/119 [==============================] - 1s 11ms/step - loss: 43288354816.0000
- val_loss: 42173083648.0000
Epoch 45/400
119/119 [==============================] - 1s 11ms/step - loss: 42954174464.0000
- val_loss: 41695920128.0000
Epoch 46/400
119/119 [==============================] - 1s 8ms/step - loss: 42531975168.0000 -
val_loss: 41479053312.0000
Epoch 47/400
119/119 [==============================] - 1s 8ms/step - loss: 42203041792.0000 -
val_loss: 40987467776.0000
Epoch 48/400
119/119 [==============================] - 1s 7ms/step - loss: 41893605376.0000 -
val_loss: 40736378880.0000
Epoch 49/400
119/119 [==============================] - 1s 8ms/step - loss: 41582620672.0000 -
val_loss: 40427692032.0000
Epoch 50/400
119/119 [==============================] - 1s 8ms/step - loss: 41332490240.0000 -
val_loss: 40087703552.0000
Epoch 51/400
119/119 [==============================] - 1s 7ms/step - loss: 41029935104.0000 -
val_loss: 39831789568.0000
Epoch 52/400
119/119 [==============================] - 1s 7ms/step - loss: 40814878720.0000 -
val_loss: 39624749056.0000
Epoch 53/400
119/119 [==============================] - 1s 7ms/step - loss: 40595152896.0000 -
val_loss: 39361155072.0000
Epoch 54/400
119/119 [==============================] - 1s 7ms/step - loss: 40308662272.0000 -
val_loss: 39144529920.0000
Epoch 55/400
119/119 [==============================] - 1s 8ms/step - loss: 40096067584.0000 -
val_loss: 38899802112.0000
Epoch 56/400
119/119 [==============================] - 1s 7ms/step - loss: 39853809664.0000 -
val_loss: 38647287808.0000
Epoch 57/400
119/119 [==============================] - 1s 8ms/step - loss: 39594160128.0000 -
val_loss: 38396284928.0000
Epoch 58/400
119/119 [==============================] - 1s 10ms/step - loss: 39363457024.0000
- val_loss: 38117515264.0000
Epoch 59/400
119/119 [==============================] - 1s 11ms/step - loss: 39063650304.0000
- val_loss: 37948841984.0000
Epoch 60/400
119/119 [==============================] - 1s 8ms/step - loss: 38917947392.0000 -
val_loss: 37583585280.0000
```

```
Epoch 61/400
119/119 [==============================] - 1s 9ms/step - loss: 38574874624.0000 - val_loss: 37331521536.0000
Epoch 62/400
119/119 [==============================] - 1s 6ms/step - loss: 38331666432.0000 - val_loss: 37118603264.0000
Epoch 63/400
119/119 [==============================] - 1s 9ms/step - loss: 38146240512.0000 - val_loss: 36913582080.0000
Epoch 64/400
119/119 [==============================] - 2s 17ms/step - loss: 37973225472.0000 - val_loss: 36738891776.0000
Epoch 65/400
119/119 [==============================] - 3s 23ms/step - loss: 37823188992.0000 - val_loss: 36593623040.0000
Epoch 66/400
119/119 [==============================] - 1s 7ms/step - loss: 37635522560.0000 - val_loss: 36476366848.0000
Epoch 67/400
119/119 [==============================] - 1s 9ms/step - loss: 37490282496.0000 - val_loss: 36251181056.0000
Epoch 68/400
119/119 [==============================] - 1s 8ms/step - loss: 37307207680.0000 - val_loss: 36083511296.0000
Epoch 69/400
119/119 [==============================] - 1s 6ms/step - loss: 37142589440.0000 - val_loss: 35928285184.0000
Epoch 70/400
119/119 [==============================] - 1s 6ms/step - loss: 37014093824.0000 - val_loss: 35884253184.0000
Epoch 71/400
119/119 [==============================] - 1s 8ms/step - loss: 36882313216.0000 - val_loss: 35636834304.0000
Epoch 72/400
119/119 [==============================] - 1s 7ms/step - loss: 36713168896.0000 - val_loss: 35464351744.0000
Epoch 73/400
119/119 [==============================] - 1s 6ms/step - loss: 36559106048.0000 - val_loss: 35330916352.0000
Epoch 74/400
119/119 [==============================] - 1s 7ms/step - loss: 36432711680.0000 - val_loss: 35185799168.0000
Epoch 75/400
119/119 [==============================] - 1s 8ms/step - loss: 36288016384.0000 - val_loss: 35101319168.0000
Epoch 76/400
119/119 [==============================] - 1s 6ms/step - loss: 36242432000.0000 - val_loss: 34920103936.0000
Epoch 77/400
119/119 [==============================] - 1s 6ms/step - loss: 36038025216.0000 - val_loss: 34828750848.0000
Epoch 78/400
119/119 [==============================] - 1s 8ms/step - loss: 35952312320.0000 - val_loss: 34689495040.0000
Epoch 79/400
119/119 [==============================] - 1s 10ms/step - loss: 35876675584.0000 - val_loss: 34616602624.0000
Epoch 80/400
119/119 [==============================] - 1s 8ms/step - loss: 35706912768.0000 - val_loss: 34601730048.0000
```

```
Epoch 81/400
119/119 [==============================] - 1s 8ms/step - loss: 35637751808.0000 -
val_loss: 34369662976.0000
Epoch 82/400
119/119 [==============================] - 1s 11ms/step - loss: 35511042048.0000
- val_loss: 34279559168.0000
Epoch 83/400
119/119 [==============================] - 1s 8ms/step - loss: 35423592448.0000 -
val_loss: 34223200256.0000
Epoch 84/400
119/119 [==============================] - 1s 7ms/step - loss: 35338772480.0000 -
val_loss: 34079336448.0000
Epoch 85/400
119/119 [==============================] - 1s 6ms/step - loss: 35255361536.0000 -
val_loss: 34049181696.0000
Epoch 86/400
119/119 [==============================] - 1s 6ms/step - loss: 35191795712.0000 -
val_loss: 33895854080.0000
Epoch 87/400
119/119 [==============================] - 1s 5ms/step - loss: 35144900608.0000 -
val_loss: 33825898496.0000
Epoch 88/400
119/119 [==============================] - 1s 5ms/step - loss: 34984468480.0000 -
val_loss: 33750310912.0000
Epoch 89/400
119/119 [==============================] - 1s 5ms/step - loss: 34920632320.0000 -
val_loss: 33658281984.0000
Epoch 90/400
119/119 [==============================] - 1s 5ms/step - loss: 34848489472.0000 -
val_loss: 33648007168.0000
Epoch 91/400
119/119 [==============================] - 1s 5ms/step - loss: 34792300544.0000 -
val_loss: 33563062272.0000
Epoch 92/400
119/119 [==============================] - 1s 5ms/step - loss: 34684694528.0000 -
val_loss: 33501816832.0000
Epoch 93/400
119/119 [==============================] - 1s 4ms/step - loss: 34661244928.0000 -
val_loss: 33405841408.0000
Epoch 94/400
119/119 [==============================] - 1s 5ms/step - loss: 34579591168.0000 -
val_loss: 33329440768.0000
Epoch 95/400
119/119 [==============================] - 1s 5ms/step - loss: 34527068160.0000 -
val_loss: 33286666240.0000
Epoch 96/400
119/119 [==============================] - 1s 5ms/step - loss: 34439761920.0000 -
val_loss: 33219815424.0000
Epoch 97/400
119/119 [==============================] - 1s 4ms/step - loss: 34403061760.0000 -
val_loss: 33173817344.0000
Epoch 98/400
119/119 [==============================] - 0s 4ms/step - loss: 34366423040.0000 -
val_loss: 33087862784.0000
Epoch 99/400
119/119 [==============================] - 1s 4ms/step - loss: 34310848512.0000 -
val_loss: 33048485888.0000
Epoch 100/400
119/119 [==============================] - 1s 5ms/step - loss: 34286483456.0000 -
val_loss: 32969052160.0000
```

```
Epoch 101/400
119/119 [==============================] - 1s 5ms/step - loss: 34227101696.0000 -
val_loss: 32923283456.0000
Epoch 102/400
119/119 [==============================] - 1s 5ms/step - loss: 34144155648.0000 -
val_loss: 33011257344.0000
Epoch 103/400
119/119 [==============================] - 1s 5ms/step - loss: 34158444544.0000 -
val_loss: 32806787072.0000
Epoch 104/400
119/119 [==============================] - 1s 6ms/step - loss: 34051332096.0000 -
val_loss: 33127395328.0000
Epoch 105/400
119/119 [==============================] - 1s 5ms/step - loss: 34005448704.0000 -
val_loss: 32687581184.0000
Epoch 106/400
119/119 [==============================] - 1s 5ms/step - loss: 33926823936.0000 -
val_loss: 32766820352.0000
Epoch 107/400
119/119 [==============================] - 1s 5ms/step - loss: 33995307008.0000 -
val_loss: 32611862528.0000
Epoch 108/400
119/119 [==============================] - 1s 4ms/step - loss: 33850245120.0000 -
val_loss: 32539115520.0000
Epoch 109/400
119/119 [==============================] - 1s 5ms/step - loss: 33800077312.0000 -
val_loss: 32475908096.0000
Epoch 110/400
119/119 [==============================] - 1s 5ms/step - loss: 33769007104.0000 -
val_loss: 32427218944.0000
Epoch 111/400
119/119 [==============================] - 1s 6ms/step - loss: 33700997120.0000 -
val_loss: 32375156736.0000
Epoch 112/400
119/119 [==============================] - 1s 6ms/step - loss: 33672517632.0000 -
val_loss: 32364267520.0000
Epoch 113/400
119/119 [==============================] - 1s 5ms/step - loss: 33640525824.0000 -
val_loss: 32275073024.0000
Epoch 114/400
119/119 [==============================] - 1s 6ms/step - loss: 33621530624.0000 -
val_loss: 32298866688.0000
Epoch 115/400
119/119 [==============================] - 1s 6ms/step - loss: 33534234624.0000 -
val_loss: 32177739776.0000
Epoch 116/400
119/119 [==============================] - 1s 5ms/step - loss: 33462419456.0000 -
val_loss: 32253571072.0000
Epoch 117/400
119/119 [==============================] - 1s 4ms/step - loss: 33472051200.0000 -
val_loss: 32078161920.0000
Epoch 118/400
119/119 [==============================] - 0s 4ms/step - loss: 33395668992.0000 -
val_loss: 32014864384.0000
Epoch 119/400
119/119 [==============================] - 1s 5ms/step - loss: 33374531584.0000 -
val_loss: 32053067776.0000
Epoch 120/400
119/119 [==============================] - 1s 5ms/step - loss: 33361463296.0000 -
val_loss: 31931230208.0000
```

```
Epoch 121/400
119/119 [==============================] - 1s 4ms/step - loss: 33323311104.0000 -
val_loss: 31966662656.0000
Epoch 122/400
119/119 [==============================] - 0s 4ms/step - loss: 33232756736.0000 -
val_loss: 31855583232.0000
Epoch 123/400
119/119 [==============================] - 1s 4ms/step - loss: 33183012864.0000 -
val_loss: 31797803008.0000
Epoch 124/400
119/119 [==============================] - 1s 6ms/step - loss: 33151850496.0000 -
val_loss: 31806201856.0000
Epoch 125/400
119/119 [==============================] - 1s 7ms/step - loss: 33116643328.0000 -
val_loss: 31703242752.0000
Epoch 126/400
119/119 [==============================] - 1s 7ms/step - loss: 33079822336.0000 -
val_loss: 31633391616.0000
Epoch 127/400
119/119 [==============================] - 1s 7ms/step - loss: 33049997312.0000 -
val_loss: 31680096256.0000
Epoch 128/400
119/119 [==============================] - 1s 6ms/step - loss: 32988977152.0000 -
val_loss: 31558150144.0000
Epoch 129/400
119/119 [==============================] - 4s 30ms/step - loss: 32956008448.0000
- val_loss: 31597058048.0000
Epoch 130/400
119/119 [==============================] - 4s 32ms/step - loss: 32921606144.0000
- val_loss: 31483781120.0000
Epoch 131/400
119/119 [==============================] - 3s 20ms/step - loss: 32900640768.0000
- val_loss: 31509493760.0000
Epoch 132/400
119/119 [==============================] - 3s 24ms/step - loss: 32833609728.0000
- val_loss: 31528603648.0000
Epoch 133/400
119/119 [==============================] - 1s 5ms/step - loss: 32833380352.0000 -
val_loss: 31368142848.0000
Epoch 134/400
119/119 [==============================] - 1s 8ms/step - loss: 32814297088.0000 -
val_loss: 31342374912.0000
Epoch 135/400
119/119 [==============================] - 2s 14ms/step - loss: 32805359616.0000
- val_loss: 31298865152.0000
Epoch 136/400
119/119 [==============================] - 1s 5ms/step - loss: 32704509952.0000 -
val_loss: 31271712768.0000
Epoch 137/400
119/119 [==============================] - 1s 5ms/step - loss: 32730857472.0000 -
val_loss: 31233558528.0000
Epoch 138/400
119/119 [==============================] - 1s 5ms/step - loss: 32677558272.0000 -
val_loss: 31194402816.0000
Epoch 139/400
119/119 [==============================] - 1s 5ms/step - loss: 32651476992.0000 -
val_loss: 31164375040.0000
Epoch 140/400
119/119 [==============================] - 1s 5ms/step - loss: 32654977024.0000 -
val_loss: 31168419840.0000
```

```
Epoch 141/400
119/119 [==============================] - 1s 5ms/step - loss: 32563838976.0000 -
val_loss: 31093952512.0000
Epoch 142/400
119/119 [==============================] - 1s 5ms/step - loss: 32571613184.0000 -
val_loss: 31065694208.0000
Epoch 143/400
119/119 [==============================] - 1s 4ms/step - loss: 32521000960.0000 -
val_loss: 31029762048.0000
Epoch 144/400
119/119 [==============================] - 1s 4ms/step - loss: 32521191424.0000 -
val_loss: 31008284672.0000
Epoch 145/400
119/119 [==============================] - 1s 4ms/step - loss: 32500004864.0000 -
val_loss: 31051726848.0000
Epoch 146/400
119/119 [==============================] - 1s 4ms/step - loss: 32447707136.0000 -
val_loss: 30952833024.0000
Epoch 147/400
119/119 [==============================] - 1s 4ms/step - loss: 32446906368.0000 -
val_loss: 30922160128.0000
Epoch 148/400
119/119 [==============================] - 1s 5ms/step - loss: 32372656128.0000 -
val_loss: 30899970048.0000
Epoch 149/400
119/119 [==============================] - 1s 4ms/step - loss: 32381542400.0000 -
val_loss: 30882324480.0000
Epoch 150/400
119/119 [==============================] - 0s 4ms/step - loss: 32364605440.0000 -
val_loss: 30835156992.0000
Epoch 151/400
119/119 [==============================] - 0s 4ms/step - loss: 32322314240.0000 -
val_loss: 30778908672.0000
Epoch 152/400
119/119 [==============================] - 1s 5ms/step - loss: 32320550912.0000 -
val_loss: 30762668032.0000
Epoch 153/400
119/119 [==============================] - 1s 4ms/step - loss: 32251267072.0000 -
val_loss: 30743654400.0000
Epoch 154/400
119/119 [==============================] - 0s 4ms/step - loss: 32263577600.0000 -
val_loss: 30723096576.0000
Epoch 155/400
119/119 [==============================] - 1s 4ms/step - loss: 32212572160.0000 -
val_loss: 30745303040.0000
Epoch 156/400
119/119 [==============================] - 1s 4ms/step - loss: 32240115712.0000 -
val_loss: 30652637184.0000
Epoch 157/400
119/119 [==============================] - 0s 4ms/step - loss: 32160317440.0000 -
val_loss: 30664161280.0000
Epoch 158/400
119/119 [==============================] - 0s 4ms/step - loss: 32163680256.0000 -
val_loss: 30629085184.0000
Epoch 159/400
119/119 [==============================] - 0s 4ms/step - loss: 32114610176.0000 -
val_loss: 30579183616.0000
Epoch 160/400
119/119 [==============================] - 0s 4ms/step - loss: 32085393408.0000 -
val_loss: 30545199104.0000
```

```
Epoch 161/400
119/119 [==============================] - 0s 4ms/step - loss: 32059877376.0000 -
val_loss: 30514358272.0000
Epoch 162/400
119/119 [==============================] - 0s 4ms/step - loss: 32100993024.0000 -
val_loss: 30463551488.0000
Epoch 163/400
119/119 [==============================] - 0s 4ms/step - loss: 32004671488.0000 -
val_loss: 30449987584.0000
Epoch 164/400
119/119 [==============================] - 1s 6ms/step - loss: 32015251456.0000 -
val_loss: 30452506624.0000
Epoch 165/400
119/119 [==============================] - 1s 8ms/step - loss: 31975436288.0000 -
val_loss: 30383149056.0000
Epoch 166/400
119/119 [==============================] - 1s 6ms/step - loss: 31966887936.0000 -
val_loss: 30450315264.0000
Epoch 167/400
119/119 [==============================] - 1s 6ms/step - loss: 31947220992.0000 -
val_loss: 30341931008.0000
Epoch 168/400
119/119 [==============================] - 1s 6ms/step - loss: 31914545152.0000 -
val_loss: 30309199872.0000
Epoch 169/400
119/119 [==============================] - 1s 5ms/step - loss: 31916244992.0000 -
val_loss: 30284001280.0000
Epoch 170/400
119/119 [==============================] - 1s 6ms/step - loss: 31877484544.0000 -
val_loss: 30313629696.0000
Epoch 171/400
119/119 [==============================] - 1s 6ms/step - loss: 31888451584.0000 -
val_loss: 30287165440.0000
Epoch 172/400
119/119 [==============================] - 1s 5ms/step - loss: 31833556992.0000 -
val_loss: 30212847616.0000
Epoch 173/400
119/119 [==============================] - 1s 6ms/step - loss: 31808444416.0000 -
val_loss: 30189543424.0000
Epoch 174/400
119/119 [==============================] - 1s 7ms/step - loss: 31784144896.0000 -
val_loss: 30175961088.0000
Epoch 175/400
119/119 [==============================] - 1s 5ms/step - loss: 31767838720.0000 -
val_loss: 30158286848.0000
Epoch 176/400
119/119 [==============================] - 1s 5ms/step - loss: 31744653312.0000 -
val_loss: 30131431424.0000
Epoch 177/400
119/119 [==============================] - 1s 5ms/step - loss: 31744503808.0000 -
val_loss: 30113859584.0000
Epoch 178/400
119/119 [==============================] - 1s 5ms/step - loss: 31722702848.0000 -
val_loss: 30100174848.0000
Epoch 179/400
119/119 [==============================] - 1s 5ms/step - loss: 31708585984.0000 -
val_loss: 30218889216.0000
Epoch 180/400
119/119 [==============================] - 1s 6ms/step - loss: 31690897408.0000 -
val_loss: 30049886208.0000
```

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Epoch 181/400
119/119 [==============================] - 1s 5ms/step - loss: 31641485312.0000 -
val_loss: 30083086336.0000
Epoch 182/400
119/119 [==============================] - 1s 5ms/step - loss: 31642560512.0000 -
val_loss: 30039097344.0000
Epoch 183/400
119/119 [==============================] - 1s 5ms/step - loss: 31654946816.0000 -
val_loss: 29969352704.0000
Epoch 184/400
119/119 [==============================] - 1s 4ms/step - loss: 31603847168.0000 -
val_loss: 29941870592.0000
Epoch 185/400
119/119 [==============================] - 1s 4ms/step - loss: 31606951936.0000 -
val_loss: 29919055872.0000
Epoch 186/400
119/119 [==============================] - 1s 4ms/step - loss: 31564505088.0000 -
val_loss: 29895421952.0000
Epoch 187/400
119/119 [==============================] - 1s 4ms/step - loss: 31536508928.0000 -
val_loss: 29914818560.0000
Epoch 188/400
119/119 [==============================] - 0s 4ms/step - loss: 31520526336.0000 -
val_loss: 29822705664.0000
Epoch 189/400
119/119 [==============================] - 1s 4ms/step - loss: 31516702720.0000 -
val_loss: 29827422208.0000
Epoch 190/400
119/119 [==============================] - 1s 5ms/step - loss: 31483936768.0000 -
val_loss: 29801164800.0000
Epoch 191/400
119/119 [==============================] - 1s 5ms/step - loss: 31482017792.0000 -
val_loss: 29818882048.0000
Epoch 192/400
119/119 [==============================] - 1s 4ms/step - loss: 31437246464.0000 -
val_loss: 29741703168.0000
Epoch 193/400
119/119 [==============================] - 1s 4ms/step - loss: 31404083200.0000 -
val_loss: 29800855552.0000
Epoch 194/400
119/119 [==============================] - 0s 4ms/step - loss: 31398361088.0000 -
val_loss: 29706520576.0000
Epoch 195/400
119/119 [==============================] - 0s 4ms/step - loss: 31383660544.0000 -
val_loss: 29695719424.0000
Epoch 196/400
119/119 [==============================] - 0s 4ms/step - loss: 31383025664.0000 -
val_loss: 29680687104.0000
Epoch 197/400
119/119 [==============================] - 1s 4ms/step - loss: 31352281088.0000 -
val_loss: 29719535616.0000
Epoch 198/400
119/119 [==============================] - 1s 4ms/step - loss: 31350501376.0000 -
val_loss: 29691645952.0000
Epoch 199/400
119/119 [==============================] - 0s 4ms/step - loss: 31361861632.0000 -
val_loss: 29609238528.0000
Epoch 200/400
119/119 [==============================] - 0s 4ms/step - loss: 31297507328.0000 -
val_loss: 29564549120.0000
```

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Epoch 201/400
119/119 [==============================] - 0s 4ms/step - loss: 31286757376.0000 -
val_loss: 29594306560.0000
Epoch 202/400
119/119 [==============================] - 0s 4ms/step - loss: 31309033472.0000 -
val_loss: 29554597888.0000
Epoch 203/400
119/119 [==============================] - 1s 4ms/step - loss: 31252056064.0000 -
val_loss: 29528922112.0000
Epoch 204/400
119/119 [==============================] - 1s 5ms/step - loss: 31301455872.0000 -
val_loss: 29529380864.0000
Epoch 205/400
119/119 [==============================] - 1s 4ms/step - loss: 31237238784.0000 -
val_loss: 29553391616.0000
Epoch 206/400
119/119 [==============================] - 1s 4ms/step - loss: 31206897664.0000 -
val_loss: 29636616192.0000
Epoch 207/400
119/119 [==============================] - 1s 4ms/step - loss: 31241345024.0000 -
val_loss: 29466533888.0000
Epoch 208/400
119/119 [==============================] - 1s 4ms/step - loss: 31176288256.0000 -
val_loss: 29496162304.0000
Epoch 209/400
119/119 [==============================] - 0s 4ms/step - loss: 31166859264.0000 -
val_loss: 29430577152.0000
Epoch 210/400
119/119 [==============================] - 1s 4ms/step - loss: 31157684224.0000 -
val_loss: 29413314560.0000
Epoch 211/400
119/119 [==============================] - 1s 5ms/step - loss: 31160352768.0000 -
val_loss: 29381892096.0000
Epoch 212/400
119/119 [==============================] - 1s 5ms/step - loss: 31120674816.0000 -
val_loss: 29530583040.0000
Epoch 213/400
119/119 [==============================] - 0s 4ms/step - loss: 31105275904.0000 -
val_loss: 29354981376.0000
Epoch 214/400
119/119 [==============================] - 1s 5ms/step - loss: 31086766080.0000 -
val_loss: 29355716608.0000
Epoch 215/400
119/119 [==============================] - 1s 5ms/step - loss: 31098195968.0000 -
val_loss: 29305536512.0000
Epoch 216/400
119/119 [==============================] - 1s 5ms/step - loss: 31070613504.0000 -
val_loss: 29309642752.0000
Epoch 217/400
119/119 [==============================] - 1s 5ms/step - loss: 31035211776.0000 -
val_loss: 29286580224.0000
Epoch 218/400
119/119 [==============================] - 1s 5ms/step - loss: 31020486656.0000 -
val_loss: 29294034944.0000
Epoch 219/400
119/119 [==============================] - 1s 4ms/step - loss: 31056951296.0000 -
val_loss: 29249888256.0000
Epoch 220/400
119/119 [==============================] - 1s 5ms/step - loss: 30991468544.0000 -
val_loss: 29247606784.0000
```

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Epoch 221/400
119/119 [==============================] - 1s 5ms/step - loss: 31053033472.0000 -
val_loss: 29334720512.0000
Epoch 222/400
119/119 [==============================] - 1s 5ms/step - loss: 30970492928.0000 -
val_loss: 29198997504.0000
Epoch 223/400
119/119 [==============================] - 1s 5ms/step - loss: 31005831168.0000 -
val_loss: 29191364608.0000
Epoch 224/400
119/119 [==============================] - 1s 6ms/step - loss: 30973386752.0000 -
val_loss: 29183692800.0000
Epoch 225/400
119/119 [==============================] - 1s 5ms/step - loss: 30911199232.0000 -
val_loss: 29144514560.0000
Epoch 226/400
119/119 [==============================] - 1s 4ms/step - loss: 30914762752.0000 -
val_loss: 29151963136.0000
Epoch 227/400
119/119 [==============================] - 1s 4ms/step - loss: 30909917184.0000 -
val_loss: 29139625984.0000
Epoch 228/400
119/119 [==============================] - 1s 4ms/step - loss: 30920564736.0000 -
val_loss: 29148968960.0000
Epoch 229/400
119/119 [==============================] - 1s 4ms/step - loss: 30890993664.0000 -
val_loss: 29110351872.0000
Epoch 230/400
119/119 [==============================] - 1s 5ms/step - loss: 30872881152.0000 -
val_loss: 29099855872.0000
Epoch 231/400
119/119 [==============================] - 1s 7ms/step - loss: 30846701568.0000 -
val_loss: 29053091840.0000
Epoch 232/400
119/119 [==============================] - 1s 6ms/step - loss: 30882906112.0000 -
val_loss: 29030682624.0000
Epoch 233/400
119/119 [==============================] - 1s 7ms/step - loss: 30848839680.0000 -
val_loss: 29023682560.0000
Epoch 234/400
119/119 [==============================] - 1s 8ms/step - loss: 30830641152.0000 -
val_loss: 28983613440.0000
Epoch 235/400
119/119 [==============================] - 1s 5ms/step - loss: 30816288768.0000 -
val_loss: 28968429568.0000
Epoch 236/400
119/119 [==============================] - 0s 4ms/step - loss: 30796906496.0000 -
val_loss: 28962312192.0000
Epoch 237/400
119/119 [==============================] - 1s 4ms/step - loss: 30743173120.0000 -
val_loss: 28989222912.0000
Epoch 238/400
119/119 [==============================] - 1s 5ms/step - loss: 30725185536.0000 -
val_loss: 28941160448.0000
Epoch 239/400
119/119 [==============================] - 1s 5ms/step - loss: 30747881472.0000 -
val_loss: 28908890112.0000
Epoch 240/400
119/119 [==============================] - 1s 5ms/step - loss: 30758502400.0000 -
val_loss: 28902471680.0000
```

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Epoch 241/400
119/119 [==============================] - 0s 4ms/step - loss: 30751514624.0000 -
val_loss: 28898885632.0000
Epoch 242/400
119/119 [==============================] - 0s 4ms/step - loss: 30723375104.0000 -
val_loss: 28924588032.0000
Epoch 243/400
119/119 [==============================] - 0s 4ms/step - loss: 30713419776.0000 -
val_loss: 28870033408.0000
Epoch 244/400
119/119 [==============================] - 0s 3ms/step - loss: 30717968384.0000 -
val_loss: 28894676992.0000
Epoch 245/400
119/119 [==============================] - 0s 3ms/step - loss: 30668937216.0000 -
val_loss: 28850401280.0000
Epoch 246/400
119/119 [==============================] - 0s 4ms/step - loss: 30648815616.0000 -
val_loss: 28903368704.0000
Epoch 247/400
119/119 [==============================] - 0s 4ms/step - loss: 30691860480.0000 -
val_loss: 28814772224.0000
Epoch 248/400
119/119 [==============================] - 0s 4ms/step - loss: 30629464064.0000 -
val_loss: 28898070528.0000
Epoch 249/400
119/119 [==============================] - 1s 4ms/step - loss: 30639433728.0000 -
val_loss: 28829743104.0000
Epoch 250/400
119/119 [==============================] - 1s 4ms/step - loss: 30639200256.0000 -
val_loss: 28758986752.0000
Epoch 251/400
119/119 [==============================] - 0s 4ms/step - loss: 30601394176.0000 -
val_loss: 28775962624.0000
Epoch 252/400
119/119 [==============================] - 1s 4ms/step - loss: 30623225856.0000 -
val_loss: 28746268672.0000
Epoch 253/400
119/119 [==============================] - 0s 4ms/step - loss: 30586417152.0000 -
val_loss: 28802617344.0000
Epoch 254/400
119/119 [==============================] - 0s 4ms/step - loss: 30589077504.0000 -
val_loss: 28736919552.0000
Epoch 255/400
119/119 [==============================] - 1s 4ms/step - loss: 30615703552.0000 -
val_loss: 28883173376.0000
Epoch 256/400
119/119 [==============================] - 1s 4ms/step - loss: 30598367232.0000 -
val_loss: 28713762816.0000
Epoch 257/400
119/119 [==============================] - 0s 4ms/step - loss: 30593964032.0000 -
val_loss: 28700708864.0000
Epoch 258/400
119/119 [==============================] - 1s 5ms/step - loss: 30559113216.0000 -
val_loss: 28650997760.0000
Epoch 259/400
119/119 [==============================] - 1s 4ms/step - loss: 30531948544.0000 -
val_loss: 28653819904.0000
Epoch 260/400
119/119 [==============================] - 0s 4ms/step - loss: 30536022016.0000 -
val_loss: 28644521984.0000
```

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Epoch 261/400
119/119 [==============================] - 0s 4ms/step - loss: 30520252416.0000 -
val_loss: 28643407872.0000
Epoch 262/400
119/119 [==============================] - 1s 4ms/step - loss: 30514098176.0000 -
val_loss: 28613142528.0000
Epoch 263/400
119/119 [==============================] - 0s 4ms/step - loss: 30539886592.0000 -
val_loss: 28611221504.0000
Epoch 264/400
119/119 [==============================] - 0s 4ms/step - loss: 30482307072.0000 -
val_loss: 28564111360.0000
Epoch 265/400
119/119 [==============================] - 0s 4ms/step - loss: 30468880384.0000 -
val_loss: 28565032960.0000
Epoch 266/400
119/119 [==============================] - 1s 5ms/step - loss: 30483271680.0000 -
val_loss: 28729270272.0000
Epoch 267/400
119/119 [==============================] - 1s 4ms/step - loss: 30451472384.0000 -
val_loss: 28609914880.0000
Epoch 268/400
119/119 [==============================] - 0s 4ms/step - loss: 30410172416.0000 -
val_loss: 28547471360.0000
Epoch 269/400
119/119 [==============================] - 0s 4ms/step - loss: 30421368832.0000 -
val_loss: 28604811264.0000
Epoch 270/400
119/119 [==============================] - 0s 4ms/step - loss: 30415763456.0000 -
val_loss: 28499828736.0000
Epoch 271/400
119/119 [==============================] - 0s 4ms/step - loss: 30394300416.0000 -
val_loss: 28462821376.0000
Epoch 272/400
119/119 [==============================] - 0s 4ms/step - loss: 30381352960.0000 -
val_loss: 28568539136.0000
Epoch 273/400
119/119 [==============================] - 1s 5ms/step - loss: 30431406080.0000 -
val_loss: 28604723200.0000
Epoch 274/400
119/119 [==============================] - 1s 5ms/step - loss: 30411063296.0000 -
val_loss: 28450680832.0000
Epoch 275/400
119/119 [==============================] - 0s 4ms/step - loss: 30363344896.0000 -
val_loss: 28477775872.0000
Epoch 276/400
119/119 [==============================] - 0s 4ms/step - loss: 30385743872.0000 -
val_loss: 28442464256.0000
Epoch 277/400
119/119 [==============================] - 1s 5ms/step - loss: 30369814528.0000 -
val_loss: 28439975936.0000
Epoch 278/400
119/119 [==============================] - 1s 5ms/step - loss: 30328592384.0000 -
val_loss: 28365785088.0000
Epoch 279/400
119/119 [==============================] - 1s 4ms/step - loss: 30329196544.0000 -
val_loss: 28331008000.0000
Epoch 280/400
119/119 [==============================] - 1s 5ms/step - loss: 30309552128.0000 -
val_loss: 28344576000.0000
```

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Epoch 281/400
119/119 [==============================] - 1s 5ms/step - loss: 30351337472.0000 -
val_loss: 28292040704.0000
Epoch 282/400
119/119 [==============================] - 1s 5ms/step - loss: 30296002560.0000 -
val_loss: 28341043200.0000
Epoch 283/400
119/119 [==============================] - 0s 4ms/step - loss: 30339497984.0000 -
val_loss: 28379758592.0000
Epoch 284/400
119/119 [==============================] - 1s 4ms/step - loss: 30287915008.0000 -
val_loss: 28279928832.0000
Epoch 285/400
119/119 [==============================] - 1s 5ms/step - loss: 30257784832.0000 -
val_loss: 28263133184.0000
Epoch 286/400
119/119 [==============================] - 1s 5ms/step - loss: 30266894336.0000 -
val_loss: 28313931776.0000
Epoch 287/400
119/119 [==============================] - 1s 6ms/step - loss: 30242668544.0000 -
val_loss: 28339144704.0000
Epoch 288/400
119/119 [==============================] - 1s 5ms/step - loss: 30241740800.0000 -
val_loss: 28227037184.0000
Epoch 289/400
119/119 [==============================] - 1s 6ms/step - loss: 30224033792.0000 -
val_loss: 28204845056.0000
Epoch 290/400
119/119 [==============================] - 1s 5ms/step - loss: 30237302784.0000 -
val_loss: 28191942656.0000
Epoch 291/400
119/119 [==============================] - 1s 5ms/step - loss: 30180710400.0000 -
val_loss: 28288851968.0000
Epoch 292/400
119/119 [==============================] - 1s 7ms/step - loss: 30232147968.0000 -
val_loss: 28158351360.0000
Epoch 293/400
119/119 [==============================] - 1s 6ms/step - loss: 30163253248.0000 -
val_loss: 28219623424.0000
Epoch 294/400
119/119 [==============================] - 1s 5ms/step - loss: 30162522112.0000 -
val_loss: 28272214016.0000
Epoch 295/400
119/119 [==============================] - 1s 5ms/step - loss: 30135220224.0000 -
val_loss: 28137664512.0000
Epoch 296/400
119/119 [==============================] - 0s 4ms/step - loss: 30104365056.0000 -
val_loss: 28168501248.0000
Epoch 297/400
119/119 [==============================] - 0s 4ms/step - loss: 30120321024.0000 -
val_loss: 28128397312.0000
Epoch 298/400
119/119 [==============================] - 0s 4ms/step - loss: 30128035840.0000 -
val_loss: 28087060480.0000
Epoch 299/400
119/119 [==============================] - 1s 4ms/step - loss: 30064478208.0000 -
val_loss: 28209532928.0000
Epoch 300/400
119/119 [==============================] - 0s 4ms/step - loss: 30105122816.0000 -
val_loss: 28169113600.0000
```

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Epoch 301/400
119/119 [==============================] - 0s 4ms/step - loss: 30117588992.0000 -
val_loss: 28060504064.0000
Epoch 302/400
119/119 [==============================] - 0s 4ms/step - loss: 30104725504.0000 -
val_loss: 28018849792.0000
Epoch 303/400
119/119 [==============================] - 0s 4ms/step - loss: 30065131520.0000 -
val_loss: 28018819072.0000
Epoch 304/400
119/119 [==============================] - 0s 4ms/step - loss: 30029572096.0000 -
val_loss: 28054644736.0000
Epoch 305/400
119/119 [==============================] - 0s 4ms/step - loss: 30050330624.0000 -
val_loss: 28002387968.0000
Epoch 306/400
119/119 [==============================] - 1s 5ms/step - loss: 30090057728.0000 -
val_loss: 27977652224.0000
Epoch 307/400
119/119 [==============================] - 0s 4ms/step - loss: 30052648960.0000 -
val_loss: 27955832832.0000
Epoch 308/400
119/119 [==============================] - 1s 5ms/step - loss: 29975607296.0000 -
val_loss: 27929036800.0000
Epoch 309/400
119/119 [==============================] - 1s 5ms/step - loss: 29998352384.0000 -
val_loss: 27971868672.0000
Epoch 310/400
119/119 [==============================] - 1s 7ms/step - loss: 29984108544.0000 -
val_loss: 27897147392.0000
Epoch 311/400
119/119 [==============================] - 1s 5ms/step - loss: 29962805248.0000 -
val_loss: 27892289536.0000
Epoch 312/400
119/119 [==============================] - 1s 5ms/step - loss: 29978126336.0000 -
val_loss: 27900581888.0000
Epoch 313/400
119/119 [==============================] - 1s 5ms/step - loss: 29957625856.0000 -
val_loss: 27888994304.0000
Epoch 314/400
119/119 [==============================] - 0s 4ms/step - loss: 29913489408.0000 -
val_loss: 27835164672.0000
Epoch 315/400
119/119 [==============================] - 0s 4ms/step - loss: 29915697152.0000 -
val_loss: 27839469568.0000
Epoch 316/400
119/119 [==============================] - 0s 4ms/step - loss: 29908854784.0000 -
val_loss: 27851188224.0000
Epoch 317/400
119/119 [==============================] - 1s 4ms/step - loss: 29930999808.0000 -
val_loss: 27913805824.0000
Epoch 318/400
119/119 [==============================] - 1s 4ms/step - loss: 29897199616.0000 -
val_loss: 27856889856.0000
Epoch 319/400
119/119 [==============================] - 1s 4ms/step - loss: 29910503424.0000 -
val_loss: 27778834432.0000
Epoch 320/400
119/119 [==============================] - 0s 4ms/step - loss: 29891065856.0000 -
val_loss: 27796140032.0000
```

```
Epoch 321/400
119/119 [==============================] - 1s 4ms/step - loss: 29850722304.0000 -
val_loss: 27744749568.0000
Epoch 322/400
119/119 [==============================] - 1s 4ms/step - loss: 29840930816.0000 -
val_loss: 27730112512.0000
Epoch 323/400
119/119 [==============================] - 1s 4ms/step - loss: 29840543744.0000 -
val_loss: 27708731392.0000
Epoch 324/400
119/119 [==============================] - 0s 4ms/step - loss: 29822363648.0000 -
val_loss: 27685570560.0000
Epoch 325/400
119/119 [==============================] - 0s 4ms/step - loss: 29812836352.0000 -
val_loss: 27713470464.0000
Epoch 326/400
119/119 [==============================] - 1s 5ms/step - loss: 29802420224.0000 -
val_loss: 27707422720.0000
Epoch 327/400
119/119 [==============================] - 1s 5ms/step - loss: 29854011392.0000 -
val_loss: 27619162112.0000
Epoch 328/400
119/119 [==============================] - 0s 4ms/step - loss: 29781567488.0000 -
val_loss: 27659737088.0000
Epoch 329/400
119/119 [==============================] - 1s 4ms/step - loss: 29826766848.0000 -
val_loss: 27620218880.0000
Epoch 330/400
119/119 [==============================] - 1s 6ms/step - loss: 29793554432.0000 -
val_loss: 27621541888.0000
Epoch 331/400
119/119 [==============================] - 1s 5ms/step - loss: 29742563328.0000 -
val_loss: 27610017792.0000
Epoch 332/400
119/119 [==============================] - 1s 5ms/step - loss: 29818302464.0000 -
val_loss: 27645659136.0000
Epoch 333/400
119/119 [==============================] - 1s 5ms/step - loss: 29741436928.0000 -
val_loss: 27615612928.0000
Epoch 334/400
119/119 [==============================] - 1s 4ms/step - loss: 29775392768.0000 -
val_loss: 27560069120.0000
Epoch 335/400
119/119 [==============================] - 0s 4ms/step - loss: 29720991744.0000 -
val_loss: 27543631872.0000
Epoch 336/400
119/119 [==============================] - 0s 4ms/step - loss: 29719093248.0000 -
val_loss: 27664838656.0000
Epoch 337/400
119/119 [==============================] - 1s 4ms/step - loss: 29704071168.0000 -
val_loss: 27570425856.0000
Epoch 338/400
119/119 [==============================] - 0s 4ms/step - loss: 29681307648.0000 -
val_loss: 27524079616.0000
Epoch 339/400
119/119 [==============================] - 0s 4ms/step - loss: 29666758656.0000 -
val_loss: 27459876864.0000
Epoch 340/400
119/119 [==============================] - 1s 4ms/step - loss: 29671757824.0000 -
val_loss: 27461003264.0000
```

```
Epoch 341/400
119/119 [==============================] - 0s 4ms/step - loss: 29643481088.0000 -
val_loss: 27445792768.0000
Epoch 342/400
119/119 [==============================] - 0s 4ms/step - loss: 29635821568.0000 -
val_loss: 27415463936.0000
Epoch 343/400
119/119 [==============================] - 1s 6ms/step - loss: 29625702400.0000 -
val_loss: 27420489728.0000
Epoch 344/400
119/119 [==============================] - 1s 8ms/step - loss: 29615480832.0000 -
val_loss: 27404521472.0000
Epoch 345/400
119/119 [==============================] - 1s 6ms/step - loss: 29664790528.0000 -
val_loss: 27397533696.0000
Epoch 346/400
119/119 [==============================] - 1s 4ms/step - loss: 29590484992.0000 -
val_loss: 27385352192.0000
Epoch 347/400
119/119 [==============================] - 0s 4ms/step - loss: 29588312064.0000 -
val_loss: 27425802240.0000
Epoch 348/400
119/119 [==============================] - 1s 6ms/step - loss: 29544937472.0000 -
val_loss: 27323510784.0000
Epoch 349/400
119/119 [==============================] - 1s 5ms/step - loss: 29565861888.0000 -
val_loss: 27323801600.0000
Epoch 350/400
119/119 [==============================] - 1s 5ms/step - loss: 29575051264.0000 -
val_loss: 27300016128.0000
Epoch 351/400
119/119 [==============================] - 1s 5ms/step - loss: 29541785600.0000 -
val_loss: 27296124928.0000
Epoch 352/400
119/119 [==============================] - 1s 4ms/step - loss: 29541435392.0000 -
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Epoch 353/400
119/119 [==============================] - 1s 4ms/step - loss: 29582616576.0000 -
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Epoch 354/400
119/119 [==============================] - 1s 4ms/step - loss: 29518516224.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29521625088.0000 -
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Epoch 356/400
119/119 [==============================] - 0s 4ms/step - loss: 29487222784.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29467353088.0000 -
val_loss: 27214211072.0000
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119/119 [==============================] - 1s 4ms/step - loss: 29444691968.0000 -
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Epoch 359/400
119/119 [==============================] - 0s 4ms/step - loss: 29474351104.0000 -
val_loss: 27199569920.0000
Epoch 360/400
119/119 [==============================] - 0s 4ms/step - loss: 29466470400.0000 -
val_loss: 27185453056.0000
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Epoch 361/400
119/119 [==============================] - 0s 4ms/step - loss: 29425170432.0000 -
val_loss: 27145857024.0000
Epoch 362/400
119/119 [==============================] - 0s 4ms/step - loss: 29402470400.0000 -
val_loss: 27163344896.0000
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119/119 [==============================] - 0s 4ms/step - loss: 29389709312.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29489192960.0000 -
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119/119 [==============================] - 1s 4ms/step - loss: 29369016320.0000 -
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119/119 [==============================] - 1s 6ms/step - loss: 29376151552.0000 -
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119/119 [==============================] - 1s 5ms/step - loss: 29351485440.0000 -
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119/119 [==============================] - 1s 4ms/step - loss: 29362016256.0000 -
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119/119 [==============================] - 1s 4ms/step - loss: 29321402368.0000 -
val_loss: 27087237120.0000
Epoch 371/400
119/119 [==============================] - 1s 4ms/step - loss: 29324906496.0000 -
val_loss: 27009830912.0000
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119/119 [==============================] - 0s 4ms/step - loss: 29358092288.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29302908928.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29280790528.0000 -
val_loss: 26943868928.0000
Epoch 375/400
119/119 [==============================] - 1s 4ms/step - loss: 29333137408.0000 -
val_loss: 26957867008.0000
Epoch 376/400
119/119 [==============================] - 1s 5ms/step - loss: 29255892992.0000 -
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119/119 [==============================] - 1s 5ms/step - loss: 29255053312.0000 -
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119/119 [==============================] - 1s 6ms/step - loss: 29241554944.0000 -
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Epoch 379/400
119/119 [==============================] - 1s 4ms/step - loss: 29262039040.0000 -
val_loss: 26891044864.0000
Epoch 380/400
119/119 [==============================] - 0s 4ms/step - loss: 29218942976.0000 -
val_loss: 26906265600.0000
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```
Epoch 381/400
119/119 [==============================] - 1s 5ms/step - loss: 29232078848.0000 -
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Epoch 382/400
119/119 [==============================] - 1s 5ms/step - loss: 29275680768.0000 -
val_loss: 26889832448.0000
Epoch 383/400
119/119 [==============================] - 1s 4ms/step - loss: 29178777600.0000 -
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Epoch 384/400
119/119 [==============================] - 1s 6ms/step - loss: 29163005952.0000 -
val_loss: 26849505280.0000
Epoch 385/400
119/119 [==============================] - 1s 4ms/step - loss: 29173948416.0000 -
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119/119 [==============================] - 1s 4ms/step - loss: 29195804672.0000 -
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119/119 [==============================] - 1s 4ms/step - loss: 29180385280.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29142857728.0000 -
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119/119 [==============================] - 0s 4ms/step - loss: 29105799168.0000 -
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Epoch 390/400
119/119 [==============================] - 0s 4ms/step - loss: 29169094656.0000 -
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Epoch 391/400
119/119 [==============================] - 0s 4ms/step - loss: 29121495040.0000 -
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Epoch 392/400
119/119 [==============================] - 0s 4ms/step - loss: 29085229056.0000 -
val_loss: 26773809152.0000
Epoch 393/400
119/119 [==============================] - 0s 4ms/step - loss: 29102149632.0000 -
val_loss: 26767071232.0000
Epoch 394/400
119/119 [==============================] - 0s 4ms/step - loss: 29077846016.0000 -
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Epoch 395/400
119/119 [==============================] - 1s 5ms/step - loss: 29075640320.0000 -
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Epoch 396/400
119/119 [==============================] - 1s 6ms/step - loss: 29046906880.0000 -
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Epoch 397/400
119/119 [==============================] - 1s 5ms/step - loss: 29114288128.0000 -
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Epoch 398/400
119/119 [==============================] - 1s 5ms/step - loss: 29062002688.0000 -
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Epoch 399/400
119/119 [==============================] - 1s 5ms/step - loss: 29056047104.0000 -
val_loss: 26731476992.0000
Epoch 400/400
119/119 [==============================] - 1s 6ms/step - loss: 29041213440.0000 -
val_loss: 26709970944.0000
```

Out[39]: <keras.callbacks.History at 0x115ac7155e0>

Model Evaluation and Predictions

In [41]:
```
# we can get histrory of those losses
model.history.history
```

Out[41]:
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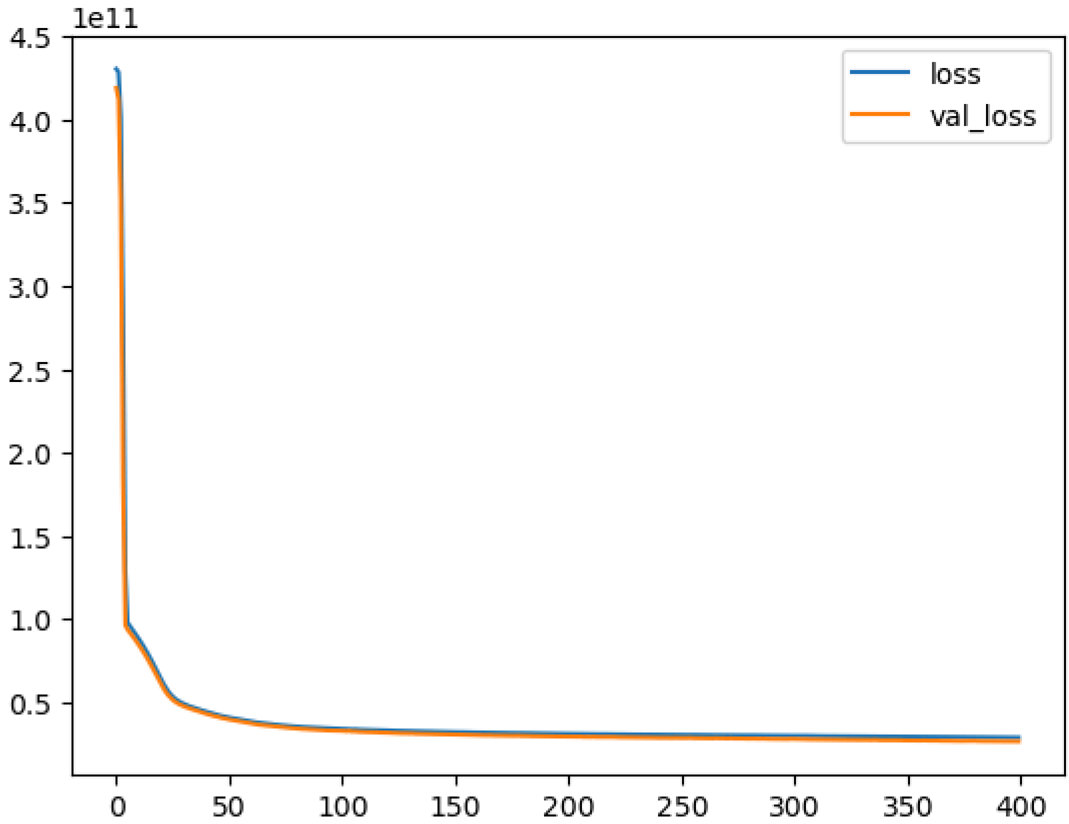
```

In [42]:
```
#  since we requested validation it will provide the validation losses too; in t
# In order to see if i'm overfitting the model
losses = pd.DataFrame(model.history.history)
```

In [43]:
```
losses.plot()
```

Out[43]: <Axes: >



In [45]:
```
#There is decrease in training loss and validation loss and are aligned
```

In [46]:
```
from sklearn.metrics import mean_squared_error, mean_absolute_error, explained_v
```

In [47]:
```
predictions = model.predict(X_test)
```
```
203/203 [==============================] - 1s 2ms/step
```

In [49]:
```
np.sqrt(mean_squared_error(y_test, predictions))
```
Out[49]:
```
163431.8572873087
```

In [50]:
```
mean_absolute_error(y_test, predictions)
```
Out[50]:
```
100860.74822832273
```

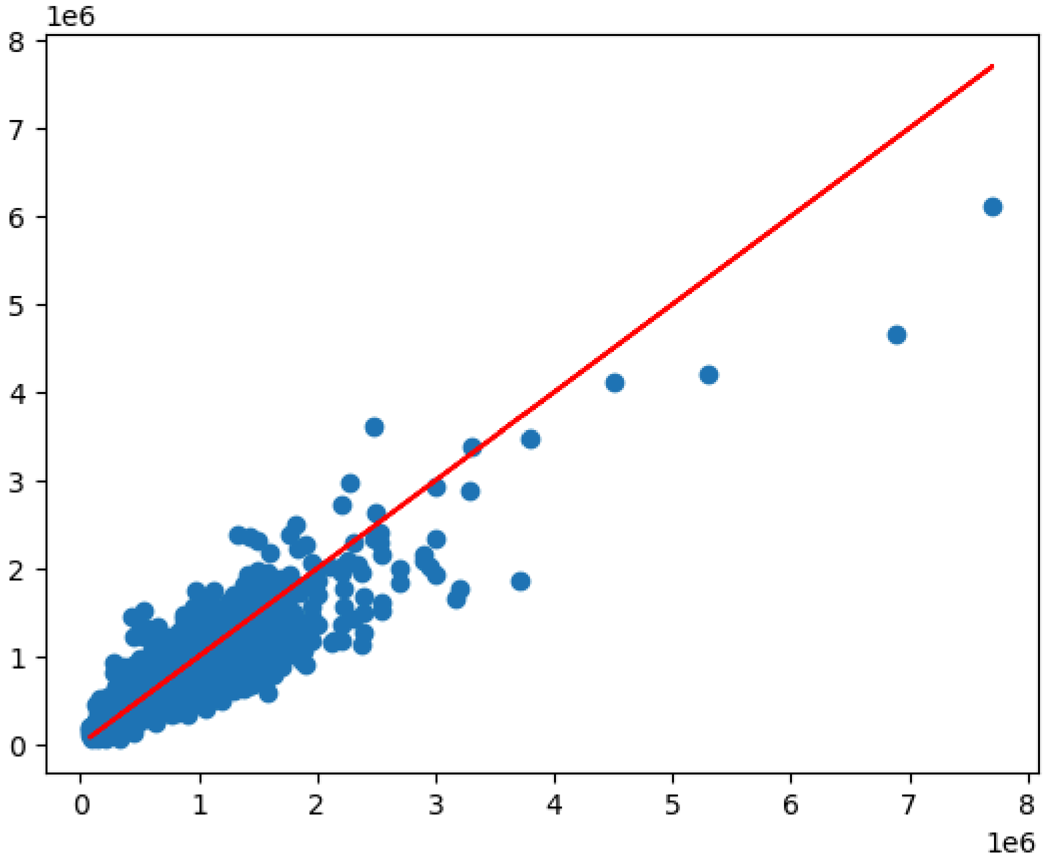
In [51]:
```
df['price'].describe()
```
Out[51]:
```
count    2.159700e+04
mean     5.402966e+05
std      3.673681e+05
min      7.800000e+04
25%      3.220000e+05
50%      4.500000e+05
75%      6.450000e+05
max      7.700000e+06
Name: price, dtype: float64
```

In [52]:
```
5.402966e+05
```
Out[52]:
```
540296.6
```

In [53]:
```
# The average house price is around 540296.6 and our mean absolute error is arou
```

In [55]:
```
#Best possible score is 1.0, lower values are worse.
explained_variance_score(y_test, predictions)
```
Out[55]:
```
0.7991671867223884
```

In [57]:
```
plt.scatter(y_test, predictions)
plt.plot(y_test, y_test, 'r')
```
Out[57]:
```
[<matplotlib.lines.Line2D at 0x115b2ebf370>]
```



In [58]:
```
#In the above the red line represent the best or prefect predicition line. we ar
```

In [59]:
```
# It is worth retrain our model
```

In [60]:
```
df
```

Out[60]:

	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view
0	221900.0	3	1.00	1180	5650	1.0	0	0
1	538000.0	3	2.25	2570	7242	2.0	0	0
2	180000.0	2	1.00	770	10000	1.0	0	0
3	604000.0	4	3.00	1960	5000	1.0	0	0
4	510000.0	3	2.00	1680	8080	1.0	0	0
...	...	...	...	...	...	...	...	...
21592	360000.0	3	2.50	1530	1131	3.0	0	0
21593	400000.0	4	2.50	2310	5813	2.0	0	0
21594	402101.0	2	0.75	1020	1350	2.0	0	0
21595	400000.0	3	2.50	1600	2388	2.0	0	0
21596	325000.0	2	0.75	1020	1076	2.0	0	0

21597 rows × 20 columns

In [66]:
```
# The below are the only features of new house in the market
single_house = df.drop('price', axis=1).iloc[0]
```

In [68]:
```
single_house = scaler.transform(single_house.values.reshape(-1,19))
```

```
C:\learnings\envs\deeplearning\lib\site-packages\sklearn\base.py:450: UserWarnin
g: X does not have valid feature names, but MinMaxScaler was fitted with feature
names
  warnings.warn(
```

In [69]:
```
model.predict(single_house)
```

```
1/1 [==============================] - 0s 28ms/step
```

Out[69]: array([[284654.5]], dtype=float32)

In [70]:
```
df.head()
```

Out[70]:

	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	conc
0	221900.0	3	1.00	1180	5650	1.0	0	0	
1	538000.0	3	2.25	2570	7242	2.0	0	0	
2	180000.0	2	1.00	770	10000	1.0	0	0	
3	604000.0	4	3.00	1960	5000	1.0	0	0	
4	510000.0	3	2.00	1680	8080	1.0	0	0	

In [72]:
```
# The predicted price is 284654.5 vs the true price the house sold at 221900.0;
#maybe that is causing the difference in price predictions
```

In [73]:
```
#Let's train our model with dense data set by removing the rows whose house pric
```

In [101…
```
df_filtered = df[df['price'] <= 800000]
```

In [102…
```
from sklearn.model_selection import train_test_split
```

In [103…
```
X = df_filtered.drop('price', axis=1)
y = df_filtered['price'].values
```

In [104…
```
X_train, X_test, y_train, y_test = train_test_split( X, y, test_size=0.3, random
```

In [105…
```
from sklearn.preprocessing import MinMaxScaler
```

In [106…
```
scaler = MinMaxScaler()
```

In [107…
```
X_train = scaler.fit_transform(X_train)
```

In [108…
```
X_test = scaler.transform(X_test)
```

In [109…
```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
```

In [110…

```
X_train.shape
```

Out[110…

```
(13057, 19)
```

In [111…

```
model = Sequential()
```

In [112…

```
model.add(Dense(19, activation='relu'))
model.add(Dense(19, activation='relu'))
model.add(Dense(19, activation='relu'))
model.add(Dense(19, activation='relu'))

model.add(Dense(1))
model.compile(optimizer='adam', loss='mse')
```

In [113…

```
#we are training with X_train and Y_train as we are going we are testing with ou
model.fit(x=X_train, y= y_train, validation_data=(X_test, y_test), batch_size=12
```

```
Epoch 1/400
103/103 [==============================] - 2s 9ms/step - loss: 214654222336.0000
- val_loss: 215550246912.0000
Epoch 2/400
103/103 [==============================] - 1s 5ms/step - loss: 214236266496.0000
- val_loss: 214020440064.0000
Epoch 3/400
103/103 [==============================] - 1s 5ms/step - loss: 207873605632.0000
- val_loss: 198722846720.0000
Epoch 4/400
103/103 [==============================] - 1s 7ms/step - loss: 173856030720.0000
- val_loss: 139741446144.0000
Epoch 5/400
103/103 [==============================] - 1s 6ms/step - loss: 93108371456.0000 -
val_loss: 48124514304.0000
Epoch 6/400
103/103 [==============================] - 1s 10ms/step - loss: 27254722560.0000
- val_loss: 18281572352.0000
Epoch 7/400
103/103 [==============================] - 1s 6ms/step - loss: 17573953536.0000 -
val_loss: 17602738176.0000
Epoch 8/400
103/103 [==============================] - 0s 5ms/step - loss: 17317521408.0000 -
val_loss: 17449564160.0000
Epoch 9/400
103/103 [==============================] - 1s 5ms/step - loss: 17153852416.0000 -
val_loss: 17286397952.0000
Epoch 10/400
103/103 [==============================] - 0s 5ms/step - loss: 16990696448.0000 -
val_loss: 17122380800.0000
Epoch 11/400
103/103 [==============================] - 1s 5ms/step - loss: 16824677376.0000 -
val_loss: 16955503616.0000
Epoch 12/400
103/103 [==============================] - 0s 5ms/step - loss: 16654839808.0000 -
val_loss: 16783939584.0000
Epoch 13/400
103/103 [==============================] - 1s 5ms/step - loss: 16471005184.0000 -
val_loss: 16617796608.0000
Epoch 14/400
103/103 [==============================] - 0s 5ms/step - loss: 16305231872.0000 -
val_loss: 16436444160.0000
Epoch 15/400
103/103 [==============================] - 1s 7ms/step - loss: 16126266368.0000 -
val_loss: 16264392704.0000
Epoch 16/400
103/103 [==============================] - 1s 7ms/step - loss: 15951632384.0000 -
val_loss: 16085978112.0000
Epoch 17/400
103/103 [==============================] - 1s 5ms/step - loss: 15775172608.0000 -
val_loss: 15906924544.0000
Epoch 18/400
103/103 [==============================] - 0s 5ms/step - loss: 15588034560.0000 -
val_loss: 15726090240.0000
Epoch 19/400
103/103 [==============================] - 1s 6ms/step - loss: 15409410048.0000 -
val_loss: 15539074048.0000
Epoch 20/400
103/103 [==============================] - 1s 6ms/step - loss: 15210797056.0000 -
val_loss: 15350710272.0000
```

```
Epoch 21/400
103/103 [==============================] - 0s 5ms/step - loss: 15017576448.0000 -
val_loss: 15157758976.0000
Epoch 22/400
103/103 [==============================] - 0s 5ms/step - loss: 14835062784.0000 -
val_loss: 14973270016.0000
Epoch 23/400
103/103 [==============================] - 0s 4ms/step - loss: 14641187840.0000 -
val_loss: 14782533632.0000
Epoch 24/400
103/103 [==============================] - 0s 4ms/step - loss: 14452490240.0000 -
val_loss: 14593893376.0000
Epoch 25/400
103/103 [==============================] - 1s 5ms/step - loss: 14255731712.0000 -
val_loss: 14395401216.0000
Epoch 26/400
103/103 [==============================] - 0s 4ms/step - loss: 14055650304.0000 -
val_loss: 14196056064.0000
Epoch 27/400
103/103 [==============================] - 0s 4ms/step - loss: 13853552640.0000 -
val_loss: 13996697600.0000
Epoch 28/400
103/103 [==============================] - 0s 4ms/step - loss: 13657098240.0000 -
val_loss: 13787321344.0000
Epoch 29/400
103/103 [==============================] - 0s 4ms/step - loss: 13440566272.0000 -
val_loss: 13584886784.0000
Epoch 30/400
103/103 [==============================] - 0s 5ms/step - loss: 13231379456.0000 -
val_loss: 13376905216.0000
Epoch 31/400
103/103 [==============================] - 0s 5ms/step - loss: 13023606784.0000 -
val_loss: 13173563392.0000
Epoch 32/400
103/103 [==============================] - 1s 5ms/step - loss: 12830163968.0000 -
val_loss: 12979771392.0000
Epoch 33/400
103/103 [==============================] - 0s 5ms/step - loss: 12639218688.0000 -
val_loss: 12786670592.0000
Epoch 34/400
103/103 [==============================] - 0s 4ms/step - loss: 12429508608.0000 -
val_loss: 12590886912.0000
Epoch 35/400
103/103 [==============================] - 0s 5ms/step - loss: 12238744576.0000 -
val_loss: 12409454592.0000
Epoch 36/400
103/103 [==============================] - 0s 5ms/step - loss: 12052023296.0000 -
val_loss: 12234571776.0000
Epoch 37/400
103/103 [==============================] - 1s 8ms/step - loss: 11904884736.0000 -
val_loss: 12083973120.0000
Epoch 38/400
103/103 [==============================] - 1s 6ms/step - loss: 11724615680.0000 -
val_loss: 11903341568.0000
Epoch 39/400
103/103 [==============================] - 1s 6ms/step - loss: 11529013248.0000 -
val_loss: 11742703616.0000
Epoch 40/400
103/103 [==============================] - 1s 5ms/step - loss: 11369269248.0000 -
val_loss: 11585056768.0000
```

```
Epoch 41/400
103/103 [==============================] - 1s 5ms/step - loss: 11236871168.0000 -
val_loss: 11449366528.0000
Epoch 42/400
103/103 [==============================] - 0s 4ms/step - loss: 11072156672.0000 -
val_loss: 11317370880.0000
Epoch 43/400
103/103 [==============================] - 0s 5ms/step - loss: 10958021632.0000 -
val_loss: 11181192192.0000
Epoch 44/400
103/103 [==============================] - 1s 5ms/step - loss: 10798409728.0000 -
val_loss: 11059989504.0000
Epoch 45/400
103/103 [==============================] - 1s 6ms/step - loss: 10693877760.0000 -
val_loss: 10933777408.0000
Epoch 46/400
103/103 [==============================] - 1s 5ms/step - loss: 10549971968.0000 -
val_loss: 10829475840.0000
Epoch 47/400
103/103 [==============================] - 0s 5ms/step - loss: 10440629248.0000 -
val_loss: 10751511552.0000
Epoch 48/400
103/103 [==============================] - 0s 5ms/step - loss: 10366114816.0000 -
val_loss: 10634304512.0000
Epoch 49/400
103/103 [==============================] - 0s 5ms/step - loss: 10239234048.0000 -
val_loss: 10556211200.0000
Epoch 50/400
103/103 [==============================] - 1s 5ms/step - loss: 10161072128.0000 -
val_loss: 10470886400.0000
Epoch 51/400
103/103 [==============================] - 0s 5ms/step - loss: 10084233216.0000 -
val_loss: 10406519808.0000
Epoch 52/400
103/103 [==============================] - 0s 4ms/step - loss: 10016857088.0000 -
val_loss: 10350864384.0000
Epoch 53/400
103/103 [==============================] - 0s 4ms/step - loss: 9970607104.0000 -
val_loss: 10284964864.0000
Epoch 54/400
103/103 [==============================] - 0s 4ms/step - loss: 9881254912.0000 -
val_loss: 10241559552.0000
Epoch 55/400
103/103 [==============================] - 0s 4ms/step - loss: 9844981760.0000 -
val_loss: 10197325824.0000
Epoch 56/400
103/103 [==============================] - 0s 4ms/step - loss: 9786087424.0000 -
val_loss: 10155897856.0000
Epoch 57/400
103/103 [==============================] - 0s 5ms/step - loss: 9745239040.0000 -
val_loss: 10133726208.0000
Epoch 58/400
103/103 [==============================] - 1s 5ms/step - loss: 9705323520.0000 -
val_loss: 10088614912.0000
Epoch 59/400
103/103 [==============================] - 0s 5ms/step - loss: 9672042496.0000 -
val_loss: 10060905472.0000
Epoch 60/400
103/103 [==============================] - 1s 5ms/step - loss: 9653363712.0000 -
val_loss: 10036908032.0000
```

```
Epoch 61/400
103/103 [==============================] - 0s 4ms/step - loss: 9618857984.0000 -
val_loss: 10017472512.0000
Epoch 62/400
103/103 [==============================] - 0s 4ms/step - loss: 9587422208.0000 -
val_loss: 9989187584.0000
Epoch 63/400
103/103 [==============================] - 0s 4ms/step - loss: 9567076352.0000 -
val_loss: 9972257792.0000
Epoch 64/400
103/103 [==============================] - 0s 4ms/step - loss: 9542812672.0000 -
val_loss: 9952494592.0000
Epoch 65/400
103/103 [==============================] - 0s 5ms/step - loss: 9526823936.0000 -
val_loss: 9938455552.0000
Epoch 66/400
103/103 [==============================] - 0s 5ms/step - loss: 9506157568.0000 -
val_loss: 9933092864.0000
Epoch 67/400
103/103 [==============================] - 0s 4ms/step - loss: 9486940160.0000 -
val_loss: 9908346880.0000
Epoch 68/400
103/103 [==============================] - 0s 4ms/step - loss: 9484725248.0000 -
val_loss: 9894448128.0000
Epoch 69/400
103/103 [==============================] - 0s 5ms/step - loss: 9455128576.0000 -
val_loss: 9874071552.0000
Epoch 70/400
103/103 [==============================] - 0s 4ms/step - loss: 9445681152.0000 -
val_loss: 9865547776.0000
Epoch 71/400
103/103 [==============================] - 0s 5ms/step - loss: 9451170816.0000 -
val_loss: 9853997056.0000
Epoch 72/400
103/103 [==============================] - 1s 5ms/step - loss: 9423310848.0000 -
val_loss: 9856588800.0000
Epoch 73/400
103/103 [==============================] - 1s 6ms/step - loss: 9408557056.0000 -
val_loss: 9842800640.0000
Epoch 74/400
103/103 [==============================] - 1s 7ms/step - loss: 9390089216.0000 -
val_loss: 9882070016.0000
Epoch 75/400
103/103 [==============================] - 1s 6ms/step - loss: 9408678912.0000 -
val_loss: 9813881856.0000
Epoch 76/400
103/103 [==============================] - 1s 7ms/step - loss: 9371114496.0000 -
val_loss: 9819660288.0000
Epoch 77/400
103/103 [==============================] - 1s 6ms/step - loss: 9363287040.0000 -
val_loss: 9793823744.0000
Epoch 78/400
103/103 [==============================] - 0s 4ms/step - loss: 9352450048.0000 -
val_loss: 9819743232.0000
Epoch 79/400
103/103 [==============================] - 0s 4ms/step - loss: 9382492160.0000 -
val_loss: 9780751360.0000
Epoch 80/400
103/103 [==============================] - 0s 4ms/step - loss: 9339479040.0000 -
val_loss: 9779832832.0000
```

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Epoch 81/400
103/103 [==============================] - 0s 4ms/step - loss: 9335874560.0000 -
val_loss: 9762881536.0000
Epoch 82/400
103/103 [==============================] - 0s 4ms/step - loss: 9323252736.0000 -
val_loss: 9758262272.0000
Epoch 83/400
103/103 [==============================] - 0s 3ms/step - loss: 9314093056.0000 -
val_loss: 9752030208.0000
Epoch 84/400
103/103 [==============================] - 0s 4ms/step - loss: 9305906176.0000 -
val_loss: 9742988288.0000
Epoch 85/400
103/103 [==============================] - 0s 4ms/step - loss: 9303303168.0000 -
val_loss: 9748124672.0000
Epoch 86/400
103/103 [==============================] - 0s 4ms/step - loss: 9307427840.0000 -
val_loss: 9729794048.0000
Epoch 87/400
103/103 [==============================] - 0s 4ms/step - loss: 9292771328.0000 -
val_loss: 9719183360.0000
Epoch 88/400
103/103 [==============================] - 0s 4ms/step - loss: 9277209600.0000 -
val_loss: 9717869568.0000
Epoch 89/400
103/103 [==============================] - 0s 4ms/step - loss: 9268679680.0000 -
val_loss: 9707320320.0000
Epoch 90/400
103/103 [==============================] - 0s 4ms/step - loss: 9264993280.0000 -
val_loss: 9708069888.0000
Epoch 91/400
103/103 [==============================] - 0s 4ms/step - loss: 9302106112.0000 -
val_loss: 9704574976.0000
Epoch 92/400
103/103 [==============================] - 0s 4ms/step - loss: 9260627968.0000 -
val_loss: 9693840384.0000
Epoch 93/400
103/103 [==============================] - 0s 4ms/step - loss: 9257176064.0000 -
val_loss: 9683342336.0000
Epoch 94/400
103/103 [==============================] - 0s 4ms/step - loss: 9242689536.0000 -
val_loss: 9677283328.0000
Epoch 95/400
103/103 [==============================] - 0s 4ms/step - loss: 9233073152.0000 -
val_loss: 9674072064.0000
Epoch 96/400
103/103 [==============================] - 0s 4ms/step - loss: 9230620672.0000 -
val_loss: 9674661888.0000
Epoch 97/400
103/103 [==============================] - 0s 4ms/step - loss: 9263490048.0000 -
val_loss: 9679053824.0000
Epoch 98/400
103/103 [==============================] - 0s 5ms/step - loss: 9221523456.0000 -
val_loss: 9663847424.0000
Epoch 99/400
103/103 [==============================] - 0s 5ms/step - loss: 9228249088.0000 -
val_loss: 9651038208.0000
Epoch 100/400
103/103 [==============================] - 1s 6ms/step - loss: 9212642304.0000 -
val_loss: 9649317888.0000
```

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Epoch 101/400
103/103 [==============================] - 1s 5ms/step - loss: 9203915776.0000 -
val_loss: 9646581760.0000
Epoch 102/400
103/103 [==============================] - 1s 5ms/step - loss: 9202284544.0000 -
val_loss: 9639828480.0000
Epoch 103/400
103/103 [==============================] - 0s 5ms/step - loss: 9239752704.0000 -
val_loss: 9631724544.0000
Epoch 104/400
103/103 [==============================] - 1s 5ms/step - loss: 9190572032.0000 -
val_loss: 9639880704.0000
Epoch 105/400
103/103 [==============================] - 1s 5ms/step - loss: 9190301696.0000 -
val_loss: 9621969920.0000
Epoch 106/400
103/103 [==============================] - 0s 5ms/step - loss: 9184321536.0000 -
val_loss: 9618310144.0000
Epoch 107/400
103/103 [==============================] - 0s 5ms/step - loss: 9181173760.0000 -
val_loss: 9621405696.0000
Epoch 108/400
103/103 [==============================] - 1s 5ms/step - loss: 9182439424.0000 -
val_loss: 9623371776.0000
Epoch 109/400
103/103 [==============================] - 1s 6ms/step - loss: 9175397376.0000 -
val_loss: 9610269696.0000
Epoch 110/400
103/103 [==============================] - 1s 5ms/step - loss: 9172884480.0000 -
val_loss: 9617423360.0000
Epoch 111/400
103/103 [==============================] - 1s 5ms/step - loss: 9166979072.0000 -
val_loss: 9602691072.0000
Epoch 112/400
103/103 [==============================] - 0s 5ms/step - loss: 9165888512.0000 -
val_loss: 9618353152.0000
Epoch 113/400
103/103 [==============================] - 1s 5ms/step - loss: 9172747264.0000 -
val_loss: 9589904384.0000
Epoch 114/400
103/103 [==============================] - 1s 6ms/step - loss: 9148555264.0000 -
val_loss: 9592683520.0000
Epoch 115/400
103/103 [==============================] - 1s 5ms/step - loss: 9157876736.0000 -
val_loss: 9589231616.0000
Epoch 116/400
103/103 [==============================] - 1s 5ms/step - loss: 9152131072.0000 -
val_loss: 9575997440.0000
Epoch 117/400
103/103 [==============================] - 0s 5ms/step - loss: 9139591168.0000 -
val_loss: 9573953536.0000
Epoch 118/400
103/103 [==============================] - 0s 4ms/step - loss: 9139298304.0000 -
val_loss: 9619775488.0000
Epoch 119/400
103/103 [==============================] - 0s 4ms/step - loss: 9146176512.0000 -
val_loss: 9575929856.0000
Epoch 120/400
103/103 [==============================] - 0s 4ms/step - loss: 9132161024.0000 -
val_loss: 9570162688.0000
```

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Epoch 121/400
103/103 [==============================] - 0s 4ms/step - loss: 9126681600.0000 -
val_loss: 9560169472.0000
Epoch 122/400
103/103 [==============================] - 0s 4ms/step - loss: 9122847744.0000 -
val_loss: 9557026816.0000
Epoch 123/400
103/103 [==============================] - 0s 5ms/step - loss: 9121398784.0000 -
val_loss: 9552622592.0000
Epoch 124/400
103/103 [==============================] - 0s 4ms/step - loss: 9119618048.0000 -
val_loss: 9549628416.0000
Epoch 125/400
103/103 [==============================] - 0s 5ms/step - loss: 9113339904.0000 -
val_loss: 9549422592.0000
Epoch 126/400
103/103 [==============================] - 0s 5ms/step - loss: 9119768576.0000 -
val_loss: 9545600000.0000
Epoch 127/400
103/103 [==============================] - 1s 12ms/step - loss: 9109315584.0000 -
val_loss: 9561622528.0000
Epoch 128/400
103/103 [==============================] - 1s 11ms/step - loss: 9112903680.0000 -
val_loss: 9544435712.0000
Epoch 129/400
103/103 [==============================] - 1s 6ms/step - loss: 9117988864.0000 -
val_loss: 9538914304.0000
Epoch 130/400
103/103 [==============================] - 1s 5ms/step - loss: 9099036672.0000 -
val_loss: 9533627392.0000
Epoch 131/400
103/103 [==============================] - 0s 5ms/step - loss: 9099218944.0000 -
val_loss: 9530715136.0000
Epoch 132/400
103/103 [==============================] - 1s 5ms/step - loss: 9092357120.0000 -
val_loss: 9525598208.0000
Epoch 133/400
103/103 [==============================] - 1s 5ms/step - loss: 9093794816.0000 -
val_loss: 9522783232.0000
Epoch 134/400
103/103 [==============================] - 1s 5ms/step - loss: 9108135936.0000 -
val_loss: 9519257600.0000
Epoch 135/400
103/103 [==============================] - 1s 7ms/step - loss: 9084363776.0000 -
val_loss: 9515893760.0000
Epoch 136/400
103/103 [==============================] - 1s 5ms/step - loss: 9100367872.0000 -
val_loss: 9531736064.0000
Epoch 137/400
103/103 [==============================] - 1s 5ms/step - loss: 9084294144.0000 -
val_loss: 9512062976.0000
Epoch 138/400
103/103 [==============================] - 1s 5ms/step - loss: 9080737792.0000 -
val_loss: 9509595136.0000
Epoch 139/400
103/103 [==============================] - 1s 5ms/step - loss: 9081311232.0000 -
val_loss: 9512019968.0000
Epoch 140/400
103/103 [==============================] - 1s 6ms/step - loss: 9076729856.0000 -
val_loss: 9528796160.0000
```

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Epoch 141/400
103/103 [==============================] - 1s 7ms/step - loss: 9079942144.0000 -
val_loss: 9502411776.0000
Epoch 142/400
103/103 [==============================] - 1s 5ms/step - loss: 9071255552.0000 -
val_loss: 9509685248.0000
Epoch 143/400
103/103 [==============================] - 1s 5ms/step - loss: 9088109568.0000 -
val_loss: 9502273536.0000
Epoch 144/400
103/103 [==============================] - 1s 7ms/step - loss: 9066256384.0000 -
val_loss: 9504361472.0000
Epoch 145/400
103/103 [==============================] - 1s 6ms/step - loss: 9064376320.0000 -
val_loss: 9499304960.0000
Epoch 146/400
103/103 [==============================] - 1s 5ms/step - loss: 9066318848.0000 -
val_loss: 9498353664.0000
Epoch 147/400
103/103 [==============================] - 0s 5ms/step - loss: 9059019776.0000 -
val_loss: 9490802688.0000
Epoch 148/400
103/103 [==============================] - 0s 4ms/step - loss: 9074212864.0000 -
val_loss: 9495243776.0000
Epoch 149/400
103/103 [==============================] - 0s 4ms/step - loss: 9075404800.0000 -
val_loss: 9486939136.0000
Epoch 150/400
103/103 [==============================] - 1s 6ms/step - loss: 9070092288.0000 -
val_loss: 9494324224.0000
Epoch 151/400
103/103 [==============================] - 1s 5ms/step - loss: 9055919104.0000 -
val_loss: 9491878912.0000
Epoch 152/400
103/103 [==============================] - 0s 4ms/step - loss: 9056482304.0000 -
val_loss: 9482101760.0000
Epoch 153/400
103/103 [==============================] - 0s 4ms/step - loss: 9059257344.0000 -
val_loss: 9484234752.0000
Epoch 154/400
103/103 [==============================] - 1s 5ms/step - loss: 9051720704.0000 -
val_loss: 9480678400.0000
Epoch 155/400
103/103 [==============================] - 0s 5ms/step - loss: 9054471168.0000 -
val_loss: 9477970944.0000
Epoch 156/400
103/103 [==============================] - 1s 5ms/step - loss: 9048220672.0000 -
val_loss: 9483529216.0000
Epoch 157/400
103/103 [==============================] - 1s 7ms/step - loss: 9047819264.0000 -
val_loss: 9483783168.0000
Epoch 158/400
103/103 [==============================] - 1s 5ms/step - loss: 9075862528.0000 -
val_loss: 9491139584.0000
Epoch 159/400
103/103 [==============================] - 1s 5ms/step - loss: 9063933952.0000 -
val_loss: 9473239040.0000
Epoch 160/400
103/103 [==============================] - 0s 4ms/step - loss: 9042425856.0000 -
val_loss: 9466715136.0000
```

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Epoch 161/400
103/103 [==============================] - 0s 5ms/step - loss: 9039409152.0000 -
val_loss: 9486031872.0000
Epoch 162/400
103/103 [==============================] - 1s 6ms/step - loss: 9045139456.0000 -
val_loss: 9463535616.0000
Epoch 163/400
103/103 [==============================] - 0s 5ms/step - loss: 9050815488.0000 -
val_loss: 9487178752.0000
Epoch 164/400
103/103 [==============================] - 0s 5ms/step - loss: 9064738816.0000 -
val_loss: 9481888768.0000
Epoch 165/400
103/103 [==============================] - 0s 5ms/step - loss: 9034462208.0000 -
val_loss: 9462336512.0000
Epoch 166/400
103/103 [==============================] - 1s 6ms/step - loss: 9034741760.0000 -
val_loss: 9475880960.0000
Epoch 167/400
103/103 [==============================] - 0s 5ms/step - loss: 9041201152.0000 -
val_loss: 9467130880.0000
Epoch 168/400
103/103 [==============================] - 0s 4ms/step - loss: 9029352448.0000 -
val_loss: 9459018752.0000
Epoch 169/400
103/103 [==============================] - 0s 4ms/step - loss: 9037729792.0000 -
val_loss: 9462218752.0000
Epoch 170/400
103/103 [==============================] - 0s 4ms/step - loss: 9031410688.0000 -
val_loss: 9459013632.0000
Epoch 171/400
103/103 [==============================] - 0s 4ms/step - loss: 9028019200.0000 -
val_loss: 9463420928.0000
Epoch 172/400
103/103 [==============================] - 0s 4ms/step - loss: 9048627200.0000 -
val_loss: 9469117440.0000
Epoch 173/400
103/103 [==============================] - 0s 4ms/step - loss: 9029657600.0000 -
val_loss: 9476563968.0000
Epoch 174/400
103/103 [==============================] - 0s 4ms/step - loss: 9048854528.0000 -
val_loss: 9470761984.0000
Epoch 175/400
103/103 [==============================] - 0s 4ms/step - loss: 9031902208.0000 -
val_loss: 9464505344.0000
Epoch 176/400
103/103 [==============================] - 0s 4ms/step - loss: 9030988800.0000 -
val_loss: 9459013632.0000
Epoch 177/400
103/103 [==============================] - 0s 4ms/step - loss: 9042653184.0000 -
val_loss: 9450598400.0000
Epoch 178/400
103/103 [==============================] - 0s 4ms/step - loss: 9030301696.0000 -
val_loss: 9448315904.0000
Epoch 179/400
103/103 [==============================] - 0s 5ms/step - loss: 9020691456.0000 -
val_loss: 9461201920.0000
Epoch 180/400
103/103 [==============================] - 1s 6ms/step - loss: 9023173632.0000 -
val_loss: 9449737216.0000
```

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Epoch 181/400
103/103 [==============================] - 1s 6ms/step - loss: 9020770304.0000 -
val_loss: 9464857600.0000
Epoch 182/400
103/103 [==============================] - 1s 7ms/step - loss: 9027088384.0000 -
val_loss: 9456933888.0000
Epoch 183/400
103/103 [==============================] - 1s 6ms/step - loss: 9034660864.0000 -
val_loss: 9447401472.0000
Epoch 184/400
103/103 [==============================] - 1s 5ms/step - loss: 9024186368.0000 -
val_loss: 9446866944.0000
Epoch 185/400
103/103 [==============================] - 1s 5ms/step - loss: 9023870976.0000 -
val_loss: 9442555904.0000
Epoch 186/400
103/103 [==============================] - 0s 5ms/step - loss: 9025731584.0000 -
val_loss: 9440955392.0000
Epoch 187/400
103/103 [==============================] - 0s 4ms/step - loss: 9016060928.0000 -
val_loss: 9440373760.0000
Epoch 188/400
103/103 [==============================] - 0s 4ms/step - loss: 9016930304.0000 -
val_loss: 9441611776.0000
Epoch 189/400
103/103 [==============================] - 0s 5ms/step - loss: 9019457536.0000 -
val_loss: 9444140032.0000
Epoch 190/400
103/103 [==============================] - 0s 4ms/step - loss: 9021031424.0000 -
val_loss: 9468077056.0000
Epoch 191/400
103/103 [==============================] - 0s 4ms/step - loss: 9027156992.0000 -
val_loss: 9442548736.0000
Epoch 192/400
103/103 [==============================] - 0s 4ms/step - loss: 9015966720.0000 -
val_loss: 9439410176.0000
Epoch 193/400
103/103 [==============================] - 0s 4ms/step - loss: 9023788032.0000 -
val_loss: 9449389056.0000
Epoch 194/400
103/103 [==============================] - 1s 5ms/step - loss: 9022461952.0000 -
val_loss: 9436761088.0000
Epoch 195/400
103/103 [==============================] - 1s 6ms/step - loss: 9041073152.0000 -
val_loss: 9441625088.0000
Epoch 196/400
103/103 [==============================] - 1s 8ms/step - loss: 9016512512.0000 -
val_loss: 9435691008.0000
Epoch 197/400
103/103 [==============================] - 1s 7ms/step - loss: 9013513216.0000 -
val_loss: 9457235968.0000
Epoch 198/400
103/103 [==============================] - 1s 8ms/step - loss: 9029602304.0000 -
val_loss: 9433825280.0000
Epoch 199/400
103/103 [==============================] - 1s 7ms/step - loss: 9023109120.0000 -
val_loss: 9431761920.0000
Epoch 200/400
103/103 [==============================] - 1s 6ms/step - loss: 9008960512.0000 -
val_loss: 9435796480.0000
```

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Epoch 201/400
103/103 [==============================] - 0s 5ms/step - loss: 9014844416.0000 -
val_loss: 9437110272.0000
Epoch 202/400
103/103 [==============================] - 0s 5ms/step - loss: 9022753792.0000 -
val_loss: 9431292928.0000
Epoch 203/400
103/103 [==============================] - 0s 4ms/step - loss: 9025701888.0000 -
val_loss: 9432268800.0000
Epoch 204/400
103/103 [==============================] - 0s 4ms/step - loss: 9008572416.0000 -
val_loss: 9431459840.0000
Epoch 205/400
103/103 [==============================] - 0s 4ms/step - loss: 9036261376.0000 -
val_loss: 9455281152.0000
Epoch 206/400
103/103 [==============================] - 0s 4ms/step - loss: 9030364160.0000 -
val_loss: 9427061760.0000
Epoch 207/400
103/103 [==============================] - 0s 4ms/step - loss: 9012513792.0000 -
val_loss: 9426505728.0000
Epoch 208/400
103/103 [==============================] - 1s 5ms/step - loss: 9006887936.0000 -
val_loss: 9429901312.0000
Epoch 209/400
103/103 [==============================] - 0s 4ms/step - loss: 9005924352.0000 -
val_loss: 9428683776.0000
Epoch 210/400
103/103 [==============================] - 0s 4ms/step - loss: 9008665600.0000 -
val_loss: 9435710464.0000
Epoch 211/400
103/103 [==============================] - 0s 4ms/step - loss: 9011759104.0000 -
val_loss: 9434354688.0000
Epoch 212/400
103/103 [==============================] - 0s 4ms/step - loss: 9007378432.0000 -
val_loss: 9433713664.0000
Epoch 213/400
103/103 [==============================] - 0s 4ms/step - loss: 9029595136.0000 -
val_loss: 9446959104.0000
Epoch 214/400
103/103 [==============================] - 0s 4ms/step - loss: 9009811456.0000 -
val_loss: 9425084416.0000
Epoch 215/400
103/103 [==============================] - 0s 4ms/step - loss: 9009080320.0000 -
val_loss: 9435254784.0000
Epoch 216/400
103/103 [==============================] - 0s 4ms/step - loss: 9004785664.0000 -
val_loss: 9439216640.0000
Epoch 217/400
103/103 [==============================] - 1s 5ms/step - loss: 9035196416.0000 -
val_loss: 9430566912.0000
Epoch 218/400
103/103 [==============================] - 1s 6ms/step - loss: 9015189504.0000 -
val_loss: 9425994752.0000
Epoch 219/400
103/103 [==============================] - 1s 5ms/step - loss: 9002964992.0000 -
val_loss: 9428593664.0000
Epoch 220/400
103/103 [==============================] - 1s 5ms/step - loss: 9007156224.0000 -
val_loss: 9424994304.0000
```

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Epoch 221/400
103/103 [==============================] - 1s 7ms/step - loss: 9002190848.0000 -
val_loss: 9436689408.0000
Epoch 222/400
103/103 [==============================] - 1s 5ms/step - loss: 9012633600.0000 -
val_loss: 9420602368.0000
Epoch 223/400
103/103 [==============================] - 0s 4ms/step - loss: 9009321984.0000 -
val_loss: 9423614976.0000
Epoch 224/400
103/103 [==============================] - 1s 6ms/step - loss: 9004661760.0000 -
val_loss: 9426170880.0000
Epoch 225/400
103/103 [==============================] - 1s 5ms/step - loss: 9004234752.0000 -
val_loss: 9426665472.0000
Epoch 226/400
103/103 [==============================] - 0s 4ms/step - loss: 9012054016.0000 -
val_loss: 9435649024.0000
Epoch 227/400
103/103 [==============================] - 0s 4ms/step - loss: 9004923904.0000 -
val_loss: 9425124352.0000
Epoch 228/400
103/103 [==============================] - 1s 5ms/step - loss: 9002823680.0000 -
val_loss: 9421573120.0000
Epoch 229/400
103/103 [==============================] - 1s 5ms/step - loss: 9005064192.0000 -
val_loss: 9423504384.0000
Epoch 230/400
103/103 [==============================] - 1s 6ms/step - loss: 8997383168.0000 -
val_loss: 9417934848.0000
Epoch 231/400
103/103 [==============================] - 1s 5ms/step - loss: 9000079360.0000 -
val_loss: 9416572928.0000
Epoch 232/400
103/103 [==============================] - 1s 6ms/step - loss: 9003675648.0000 -
val_loss: 9415260160.0000
Epoch 233/400
103/103 [==============================] - 0s 4ms/step - loss: 9000064000.0000 -
val_loss: 9425581056.0000
Epoch 234/400
103/103 [==============================] - 0s 4ms/step - loss: 8998776832.0000 -
val_loss: 9423207424.0000
Epoch 235/400
103/103 [==============================] - 1s 7ms/step - loss: 9000744960.0000 -
val_loss: 9415308288.0000
Epoch 236/400
103/103 [==============================] - 1s 7ms/step - loss: 9000054784.0000 -
val_loss: 9428114432.0000
Epoch 237/400
103/103 [==============================] - 1s 6ms/step - loss: 8993899520.0000 -
val_loss: 9418624000.0000
Epoch 238/400
103/103 [==============================] - 1s 5ms/step - loss: 8997869568.0000 -
val_loss: 9424515072.0000
Epoch 239/400
103/103 [==============================] - 0s 5ms/step - loss: 8997921792.0000 -
val_loss: 9412982784.0000
Epoch 240/400
103/103 [==============================] - 0s 4ms/step - loss: 8998887424.0000 -
val_loss: 9412125696.0000
```

```
Epoch 241/400
103/103 [==============================] - 0s 4ms/step - loss: 8997568512.0000 -
val_loss: 9407963136.0000
Epoch 242/400
103/103 [==============================] - 0s 4ms/step - loss: 8988012544.0000 -
val_loss: 9405456384.0000
Epoch 243/400
103/103 [==============================] - 1s 5ms/step - loss: 8993104896.0000 -
val_loss: 9427266560.0000
Epoch 244/400
103/103 [==============================] - 0s 4ms/step - loss: 8991452160.0000 -
val_loss: 9405952000.0000
Epoch 245/400
103/103 [==============================] - 0s 4ms/step - loss: 9032634368.0000 -
val_loss: 9405109248.0000
Epoch 246/400
103/103 [==============================] - 0s 4ms/step - loss: 9000230912.0000 -
val_loss: 9405128704.0000
Epoch 247/400
103/103 [==============================] - 0s 4ms/step - loss: 9007395840.0000 -
val_loss: 9413111808.0000
Epoch 248/400
103/103 [==============================] - 0s 5ms/step - loss: 8985669632.0000 -
val_loss: 9396877312.0000
Epoch 249/400
103/103 [==============================] - 1s 5ms/step - loss: 8982625280.0000 -
val_loss: 9398598656.0000
Epoch 250/400
103/103 [==============================] - 1s 5ms/step - loss: 8978345984.0000 -
val_loss: 9416583168.0000
Epoch 251/400
103/103 [==============================] - 1s 5ms/step - loss: 8975000576.0000 -
val_loss: 9434961920.0000
Epoch 252/400
103/103 [==============================] - 1s 5ms/step - loss: 9005741056.0000 -
val_loss: 9395063808.0000
Epoch 253/400
103/103 [==============================] - 1s 5ms/step - loss: 8980396032.0000 -
val_loss: 9405391872.0000
Epoch 254/400
103/103 [==============================] - 1s 7ms/step - loss: 8988619776.0000 -
val_loss: 9400785920.0000
Epoch 255/400
103/103 [==============================] - 0s 5ms/step - loss: 8983189504.0000 -
val_loss: 9396624384.0000
Epoch 256/400
103/103 [==============================] - 1s 5ms/step - loss: 8971728896.0000 -
val_loss: 9448513536.0000
Epoch 257/400
103/103 [==============================] - 1s 6ms/step - loss: 9004162048.0000 -
val_loss: 9404995584.0000
Epoch 258/400
103/103 [==============================] - 1s 6ms/step - loss: 8976277504.0000 -
val_loss: 9398062080.0000
Epoch 259/400
103/103 [==============================] - 1s 5ms/step - loss: 8971416576.0000 -
val_loss: 9393737728.0000
Epoch 260/400
103/103 [==============================] - 0s 5ms/step - loss: 8975159296.0000 -
val_loss: 9392521216.0000
```

```
Epoch 261/400
103/103 [==============================] - 0s 5ms/step - loss: 8970063872.0000 -
val_loss: 9391412224.0000
Epoch 262/400
103/103 [==============================] - 0s 4ms/step - loss: 8973373440.0000 -
val_loss: 9399151616.0000
Epoch 263/400
103/103 [==============================] - 0s 4ms/step - loss: 8968835072.0000 -
val_loss: 9398810624.0000
Epoch 264/400
103/103 [==============================] - 0s 4ms/step - loss: 8966917120.0000 -
val_loss: 9390816256.0000
Epoch 265/400
103/103 [==============================] - 1s 5ms/step - loss: 8971250688.0000 -
val_loss: 9391525888.0000
Epoch 266/400
103/103 [==============================] - 0s 4ms/step - loss: 8972892160.0000 -
val_loss: 9403995136.0000
Epoch 267/400
103/103 [==============================] - 0s 4ms/step - loss: 8963145728.0000 -
val_loss: 9387299840.0000
Epoch 268/400
103/103 [==============================] - 0s 5ms/step - loss: 8975117312.0000 -
val_loss: 9385168896.0000
Epoch 269/400
103/103 [==============================] - 1s 5ms/step - loss: 8967814144.0000 -
val_loss: 9384121344.0000
Epoch 270/400
103/103 [==============================] - 1s 5ms/step - loss: 8965753856.0000 -
val_loss: 9380780032.0000
Epoch 271/400
103/103 [==============================] - 0s 4ms/step - loss: 8963641344.0000 -
val_loss: 9380715520.0000
Epoch 272/400
103/103 [==============================] - 0s 4ms/step - loss: 8967118848.0000 -
val_loss: 9395043328.0000
Epoch 273/400
103/103 [==============================] - 0s 5ms/step - loss: 8963197952.0000 -
val_loss: 9376774144.0000
Epoch 274/400
103/103 [==============================] - 1s 5ms/step - loss: 8959401984.0000 -
val_loss: 9432517632.0000
Epoch 275/400
103/103 [==============================] - 0s 5ms/step - loss: 9014061056.0000 -
val_loss: 9379503104.0000
Epoch 276/400
103/103 [==============================] - 1s 6ms/step - loss: 8955126784.0000 -
val_loss: 9384759296.0000
Epoch 277/400
103/103 [==============================] - 0s 5ms/step - loss: 8958212096.0000 -
val_loss: 9376382976.0000
Epoch 278/400
103/103 [==============================] - 0s 5ms/step - loss: 8957927424.0000 -
val_loss: 9374622720.0000
Epoch 279/400
103/103 [==============================] - 1s 6ms/step - loss: 8955975680.0000 -
val_loss: 9373376512.0000
Epoch 280/400
103/103 [==============================] - 1s 6ms/step - loss: 8951291904.0000 -
val_loss: 9371564032.0000
```

```
Epoch 281/400
103/103 [==============================] - 1s 7ms/step - loss: 8957865984.0000 -
val_loss: 9371403264.0000
Epoch 282/400
103/103 [==============================] - 1s 6ms/step - loss: 8954068992.0000 -
val_loss: 9372777472.0000
Epoch 283/400
103/103 [==============================] - 1s 5ms/step - loss: 8950254592.0000 -
val_loss: 9377554432.0000
Epoch 284/400
103/103 [==============================] - 0s 4ms/step - loss: 8956790784.0000 -
val_loss: 9399219200.0000
Epoch 285/400
103/103 [==============================] - 1s 6ms/step - loss: 8989202432.0000 -
val_loss: 9373498368.0000
Epoch 286/400
103/103 [==============================] - 0s 4ms/step - loss: 8944872448.0000 -
val_loss: 9368530944.0000
Epoch 287/400
103/103 [==============================] - 0s 5ms/step - loss: 8949108736.0000 -
val_loss: 9362804736.0000
Epoch 288/400
103/103 [==============================] - 1s 5ms/step - loss: 8953800704.0000 -
val_loss: 9362421760.0000
Epoch 289/400
103/103 [==============================] - 0s 5ms/step - loss: 8945000448.0000 -
val_loss: 9364730880.0000
Epoch 290/400
103/103 [==============================] - 0s 5ms/step - loss: 8987593728.0000 -
val_loss: 9379966976.0000
Epoch 291/400
103/103 [==============================] - 0s 4ms/step - loss: 8950717440.0000 -
val_loss: 9363623936.0000
Epoch 292/400
103/103 [==============================] - 0s 4ms/step - loss: 8940575744.0000 -
val_loss: 9364308992.0000
Epoch 293/400
103/103 [==============================] - 0s 4ms/step - loss: 8943338496.0000 -
val_loss: 9363253248.0000
Epoch 294/400
103/103 [==============================] - 0s 4ms/step - loss: 8939529216.0000 -
val_loss: 9363546112.0000
Epoch 295/400
103/103 [==============================] - 1s 6ms/step - loss: 8952960000.0000 -
val_loss: 9370980352.0000
Epoch 296/400
103/103 [==============================] - 0s 4ms/step - loss: 8938117120.0000 -
val_loss: 9356313600.0000
Epoch 297/400
103/103 [==============================] - 0s 4ms/step - loss: 8940953600.0000 -
val_loss: 9354376192.0000
Epoch 298/400
103/103 [==============================] - 0s 5ms/step - loss: 8940860416.0000 -
val_loss: 9355655168.0000
Epoch 299/400
103/103 [==============================] - 1s 5ms/step - loss: 8934254592.0000 -
val_loss: 9370631168.0000
Epoch 300/400
103/103 [==============================] - 1s 6ms/step - loss: 8965822464.0000 -
val_loss: 9355930624.0000
```

```
Epoch 301/400
103/103 [==============================] - 1s 9ms/step - loss: 8933695488.0000 -
val_loss: 9351514112.0000
Epoch 302/400
103/103 [==============================] - 1s 8ms/step - loss: 8941947904.0000 -
val_loss: 9350827008.0000
Epoch 303/400
103/103 [==============================] - 1s 10ms/step - loss: 8935739392.0000 -
val_loss: 9352075264.0000
Epoch 304/400
103/103 [==============================] - 1s 8ms/step - loss: 8934525952.0000 -
val_loss: 9352044544.0000
Epoch 305/400
103/103 [==============================] - 1s 7ms/step - loss: 8936072192.0000 -
val_loss: 9364791296.0000
Epoch 306/400
103/103 [==============================] - 1s 6ms/step - loss: 8931090432.0000 -
val_loss: 9357554688.0000
Epoch 307/400
103/103 [==============================] - 1s 7ms/step - loss: 8928943104.0000 -
val_loss: 9380848640.0000
Epoch 308/400
103/103 [==============================] - 1s 6ms/step - loss: 8958471168.0000 -
val_loss: 9366548480.0000
Epoch 309/400
103/103 [==============================] - 1s 6ms/step - loss: 8928245760.0000 -
val_loss: 9361917952.0000
Epoch 310/400
103/103 [==============================] - 1s 7ms/step - loss: 8932788224.0000 -
val_loss: 9355660288.0000
Epoch 311/400
103/103 [==============================] - 1s 6ms/step - loss: 8932144128.0000 -
val_loss: 9355293696.0000
Epoch 312/400
103/103 [==============================] - 1s 5ms/step - loss: 8943639552.0000 -
val_loss: 9352451072.0000
Epoch 313/400
103/103 [==============================] - 1s 5ms/step - loss: 8923529216.0000 -
val_loss: 9353655296.0000
Epoch 314/400
103/103 [==============================] - 1s 9ms/step - loss: 8930688000.0000 -
val_loss: 9378880512.0000
Epoch 315/400
103/103 [==============================] - 1s 7ms/step - loss: 8929126400.0000 -
val_loss: 9350293504.0000
Epoch 316/400
103/103 [==============================] - 1s 7ms/step - loss: 8927791104.0000 -
val_loss: 9349706752.0000
Epoch 317/400
103/103 [==============================] - 1s 8ms/step - loss: 8952068096.0000 -
val_loss: 9356544000.0000
Epoch 318/400
103/103 [==============================] - 1s 10ms/step - loss: 8927765504.0000 -
val_loss: 9380740096.0000
Epoch 319/400
103/103 [==============================] - 1s 6ms/step - loss: 8942918656.0000 -
val_loss: 9358572544.0000
Epoch 320/400
103/103 [==============================] - 1s 6ms/step - loss: 8955345920.0000 -
val_loss: 9367427072.0000
```

```
Epoch 321/400
103/103 [==============================] - 1s 5ms/step - loss: 8945882112.0000 -
val_loss: 9354984448.0000
Epoch 322/400
103/103 [==============================] - 1s 5ms/step - loss: 8924007424.0000 -
val_loss: 9352968192.0000
Epoch 323/400
103/103 [==============================] - 0s 4ms/step - loss: 8924174336.0000 -
val_loss: 9352316928.0000
Epoch 324/400
103/103 [==============================] - 1s 5ms/step - loss: 8922823680.0000 -
val_loss: 9359876096.0000
Epoch 325/400
103/103 [==============================] - 1s 7ms/step - loss: 8923460608.0000 -
val_loss: 9358149632.0000
Epoch 326/400
103/103 [==============================] - 1s 5ms/step - loss: 8925973504.0000 -
val_loss: 9349313536.0000
Epoch 327/400
103/103 [==============================] - 0s 5ms/step - loss: 8921391104.0000 -
val_loss: 9352092672.0000
Epoch 328/400
103/103 [==============================] - 0s 5ms/step - loss: 8924656640.0000 -
val_loss: 9347722240.0000
Epoch 329/400
103/103 [==============================] - 0s 4ms/step - loss: 8925803520.0000 -
val_loss: 9367800832.0000
Epoch 330/400
103/103 [==============================] - 0s 5ms/step - loss: 8926995456.0000 -
val_loss: 9348831232.0000
Epoch 331/400
103/103 [==============================] - 1s 5ms/step - loss: 8916421632.0000 -
val_loss: 9365751808.0000
Epoch 332/400
103/103 [==============================] - 1s 6ms/step - loss: 8943143936.0000 -
val_loss: 9345626112.0000
Epoch 333/400
103/103 [==============================] - 1s 5ms/step - loss: 8923011072.0000 -
val_loss: 9371463680.0000
Epoch 334/400
103/103 [==============================] - 1s 9ms/step - loss: 8923138048.0000 -
val_loss: 9353329664.0000
Epoch 335/400
103/103 [==============================] - 1s 8ms/step - loss: 8923201536.0000 -
val_loss: 9360454656.0000
Epoch 336/400
103/103 [==============================] - 1s 6ms/step - loss: 8920018944.0000 -
val_loss: 9357959168.0000
Epoch 337/400
103/103 [==============================] - 1s 7ms/step - loss: 8916918272.0000 -
val_loss: 9346162688.0000
Epoch 338/400
103/103 [==============================] - 1s 5ms/step - loss: 8914514944.0000 -
val_loss: 9364969472.0000
Epoch 339/400
103/103 [==============================] - 0s 5ms/step - loss: 8922196992.0000 -
val_loss: 9346830336.0000
Epoch 340/400
103/103 [==============================] - 1s 6ms/step - loss: 8916717568.0000 -
val_loss: 9361034240.0000
```

```
Epoch 341/400
103/103 [==============================] - 1s 6ms/step - loss: 8923594752.0000 -
val_loss: 9366494208.0000
Epoch 342/400
103/103 [==============================] - 2s 15ms/step - loss: 8926960640.0000 -
val_loss: 9346534400.0000
Epoch 343/400
103/103 [==============================] - 1s 14ms/step - loss: 8916699136.0000 -
val_loss: 9349727232.0000
Epoch 344/400
103/103 [==============================] - 1s 5ms/step - loss: 8915458048.0000 -
val_loss: 9359633408.0000
Epoch 345/400
103/103 [==============================] - 1s 6ms/step - loss: 8931536896.0000 -
val_loss: 9360757760.0000
Epoch 346/400
103/103 [==============================] - 1s 8ms/step - loss: 8960088064.0000 -
val_loss: 9339785216.0000
Epoch 347/400
103/103 [==============================] - 1s 6ms/step - loss: 8911749120.0000 -
val_loss: 9341774848.0000
Epoch 348/400
103/103 [==============================] - 1s 6ms/step - loss: 8918459392.0000 -
val_loss: 9341048832.0000
Epoch 349/400
103/103 [==============================] - 1s 6ms/step - loss: 8910022656.0000 -
val_loss: 9339874304.0000
Epoch 350/400
103/103 [==============================] - 1s 5ms/step - loss: 8914613248.0000 -
val_loss: 9345826816.0000
Epoch 351/400
103/103 [==============================] - 1s 5ms/step - loss: 8921073664.0000 -
val_loss: 9335777280.0000
Epoch 352/400
103/103 [==============================] - 1s 5ms/step - loss: 8911104000.0000 -
val_loss: 9371783168.0000
Epoch 353/400
103/103 [==============================] - 0s 4ms/step - loss: 8936584192.0000 -
val_loss: 9344363520.0000
Epoch 354/400
103/103 [==============================] - 0s 4ms/step - loss: 8909442048.0000 -
val_loss: 9344273408.0000
Epoch 355/400
103/103 [==============================] - 0s 5ms/step - loss: 8909915136.0000 -
val_loss: 9336100864.0000
Epoch 356/400
103/103 [==============================] - 0s 5ms/step - loss: 8909010944.0000 -
val_loss: 9336557568.0000
Epoch 357/400
103/103 [==============================] - 0s 4ms/step - loss: 8906793984.0000 -
val_loss: 9339418624.0000
Epoch 358/400
103/103 [==============================] - 1s 5ms/step - loss: 8907449344.0000 -
val_loss: 9332233216.0000
Epoch 359/400
103/103 [==============================] - 1s 5ms/step - loss: 8905752576.0000 -
val_loss: 9334943744.0000
Epoch 360/400
103/103 [==============================] - 1s 6ms/step - loss: 8916343808.0000 -
val_loss: 9336620032.0000
```

```
Epoch 361/400
103/103 [==============================] - 1s 5ms/step - loss: 8901957632.0000 -
val_loss: 9378954240.0000
Epoch 362/400
103/103 [==============================] - 0s 4ms/step - loss: 8904090624.0000 -
val_loss: 9344575488.0000
Epoch 363/400
103/103 [==============================] - 1s 7ms/step - loss: 8906656768.0000 -
val_loss: 9365069824.0000
Epoch 364/400
103/103 [==============================] - 1s 6ms/step - loss: 8903693312.0000 -
val_loss: 9335979008.0000
Epoch 365/400
103/103 [==============================] - 1s 5ms/step - loss: 8929960960.0000 -
val_loss: 9328819200.0000
Epoch 366/400
103/103 [==============================] - 1s 5ms/step - loss: 8901479424.0000 -
val_loss: 9328842752.0000
Epoch 367/400
103/103 [==============================] - 0s 4ms/step - loss: 8906366976.0000 -
val_loss: 9349322752.0000
Epoch 368/400
103/103 [==============================] - 0s 4ms/step - loss: 8927039488.0000 -
val_loss: 9342968832.0000
Epoch 369/400
103/103 [==============================] - 0s 5ms/step - loss: 8909598720.0000 -
val_loss: 9326685184.0000
Epoch 370/400
103/103 [==============================] - 0s 4ms/step - loss: 8899941376.0000 -
val_loss: 9329618944.0000
Epoch 371/400
103/103 [==============================] - 0s 4ms/step - loss: 8902604800.0000 -
val_loss: 9326776320.0000
Epoch 372/400
103/103 [==============================] - 0s 4ms/step - loss: 8901771264.0000 -
val_loss: 9330321408.0000
Epoch 373/400
103/103 [==============================] - 0s 4ms/step - loss: 8897408000.0000 -
val_loss: 9405684736.0000
Epoch 374/400
103/103 [==============================] - 0s 4ms/step - loss: 8987667456.0000 -
val_loss: 9327840256.0000
Epoch 375/400
103/103 [==============================] - 1s 5ms/step - loss: 8892722176.0000 -
val_loss: 9324850176.0000
Epoch 376/400
103/103 [==============================] - 0s 5ms/step - loss: 8900105216.0000 -
val_loss: 9322845184.0000
Epoch 377/400
103/103 [==============================] - 0s 4ms/step - loss: 8917082112.0000 -
val_loss: 9347809280.0000
Epoch 378/400
103/103 [==============================] - 0s 4ms/step - loss: 8905579520.0000 -
val_loss: 9326695424.0000
Epoch 379/400
103/103 [==============================] - 0s 5ms/step - loss: 8893748224.0000 -
val_loss: 9327867904.0000
Epoch 380/400
103/103 [==============================] - 0s 4ms/step - loss: 8899033088.0000 -
val_loss: 9326750720.0000
```

```
Epoch 381/400
103/103 [==============================] - 1s 5ms/step - loss: 8893746176.0000 -
val_loss: 9326065664.0000
Epoch 382/400
103/103 [==============================] - 1s 5ms/step - loss: 8889329664.0000 -
val_loss: 9335960576.0000
Epoch 383/400
103/103 [==============================] - 0s 5ms/step - loss: 8893746176.0000 -
val_loss: 9325194240.0000
Epoch 384/400
103/103 [==============================] - 0s 4ms/step - loss: 8900458496.0000 -
val_loss: 9322503168.0000
Epoch 385/400
103/103 [==============================] - 0s 4ms/step - loss: 8905996288.0000 -
val_loss: 9318460416.0000
Epoch 386/400
103/103 [==============================] - 0s 4ms/step - loss: 8896350208.0000 -
val_loss: 9321228288.0000
Epoch 387/400
103/103 [==============================] - 0s 4ms/step - loss: 8885038080.0000 -
val_loss: 9328977920.0000
Epoch 388/400
103/103 [==============================] - 1s 5ms/step - loss: 8890462208.0000 -
val_loss: 9317925888.0000
Epoch 389/400
103/103 [==============================] - 1s 5ms/step - loss: 8909631488.0000 -
val_loss: 9321056256.0000
Epoch 390/400
103/103 [==============================] - 1s 7ms/step - loss: 8882468864.0000 -
val_loss: 9330028544.0000
Epoch 391/400
103/103 [==============================] - 1s 7ms/step - loss: 8925999104.0000 -
val_loss: 9320474624.0000
Epoch 392/400
103/103 [==============================] - 1s 6ms/step - loss: 8883670016.0000 -
val_loss: 9319557120.0000
Epoch 393/400
103/103 [==============================] - 0s 5ms/step - loss: 8884593664.0000 -
val_loss: 9317872640.0000
Epoch 394/400
103/103 [==============================] - 0s 5ms/step - loss: 8881545216.0000 -
val_loss: 9323112448.0000
Epoch 395/400
103/103 [==============================] - 0s 4ms/step - loss: 8879022080.0000 -
val_loss: 9327310848.0000
Epoch 396/400
103/103 [==============================] - 1s 5ms/step - loss: 8883865600.0000 -
val_loss: 9314510848.0000
Epoch 397/400
103/103 [==============================] - 1s 5ms/step - loss: 8879540224.0000 -
val_loss: 9313868800.0000
Epoch 398/400
103/103 [==============================] - 1s 5ms/step - loss: 8877390848.0000 -
val_loss: 9312937984.0000
Epoch 399/400
103/103 [==============================] - 1s 5ms/step - loss: 8879842304.0000 -
val_loss: 9315108864.0000
Epoch 400/400
103/103 [==============================] - 1s 7ms/step - loss: 8919650304.0000 -
val_loss: 9324222464.0000
```

Out[113…

```
<keras.callbacks.History at 0x115a9ba9d90>
```

In [114…

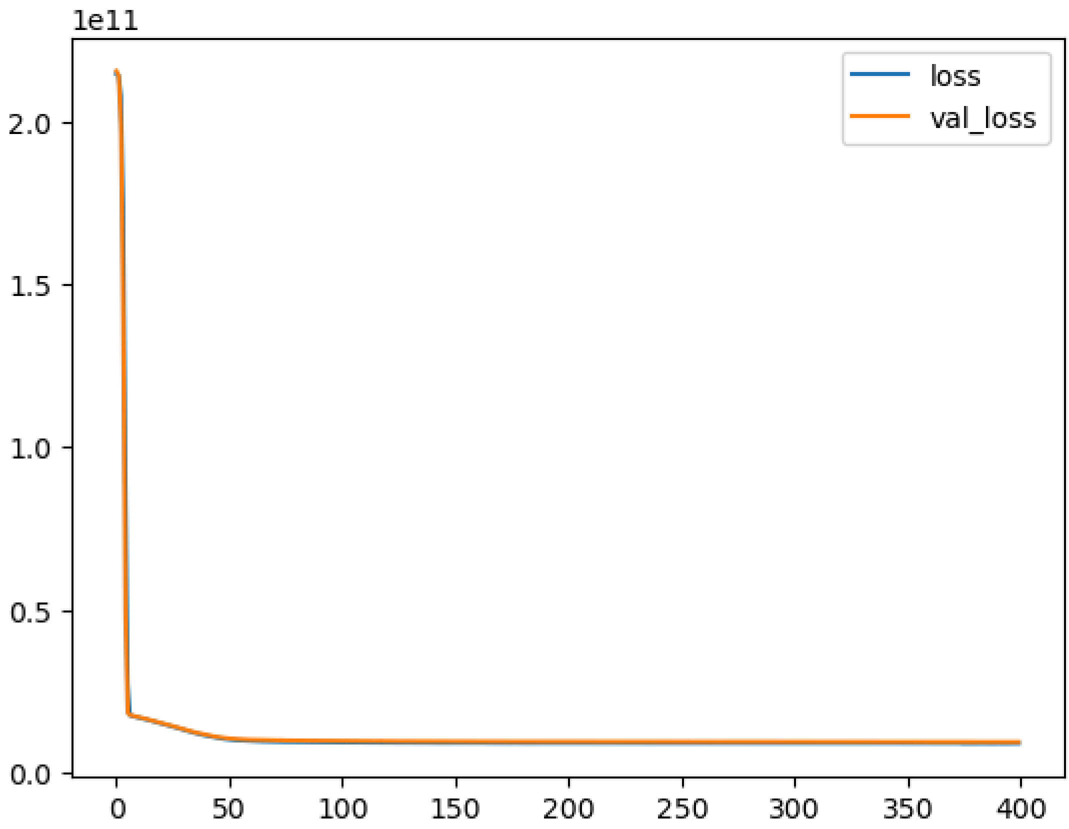
```
#  since we requested validation it will provide the validation losses too; in t
# In order to see if i'm overfitting the model
losses = pd.DataFrame(model.history.history)
```

In [115…

```
losses.plot()
```

Out[115…

```
<Axes: >
```



In [116…

```
from sklearn.metrics import mean_squared_error, mean_absolute_error, explained_v
```

In [117…

```
predictions = model.predict(X_test)
```

```
175/175 [==============================] - 1s 3ms/step
```

In [118…

```
np.sqrt(mean_squared_error(y_test, predictions))
```

Out[118…

```
96562.01306715109
```

In [119…

```
mean_absolute_error(y_test, predictions)
```

Out[119…

```
74342.13064476506
```

In [120…

```
df['price'].describe()
```

Out[120…
```
count    2.159700e+04
mean     5.402966e+05
std      3.673681e+05
min      7.800000e+04
25%      3.220000e+05
50%      4.500000e+05
75%      6.450000e+05
max      7.700000e+06
Name: price, dtype: float64
```

In [121…
```
5.402966e+05
```

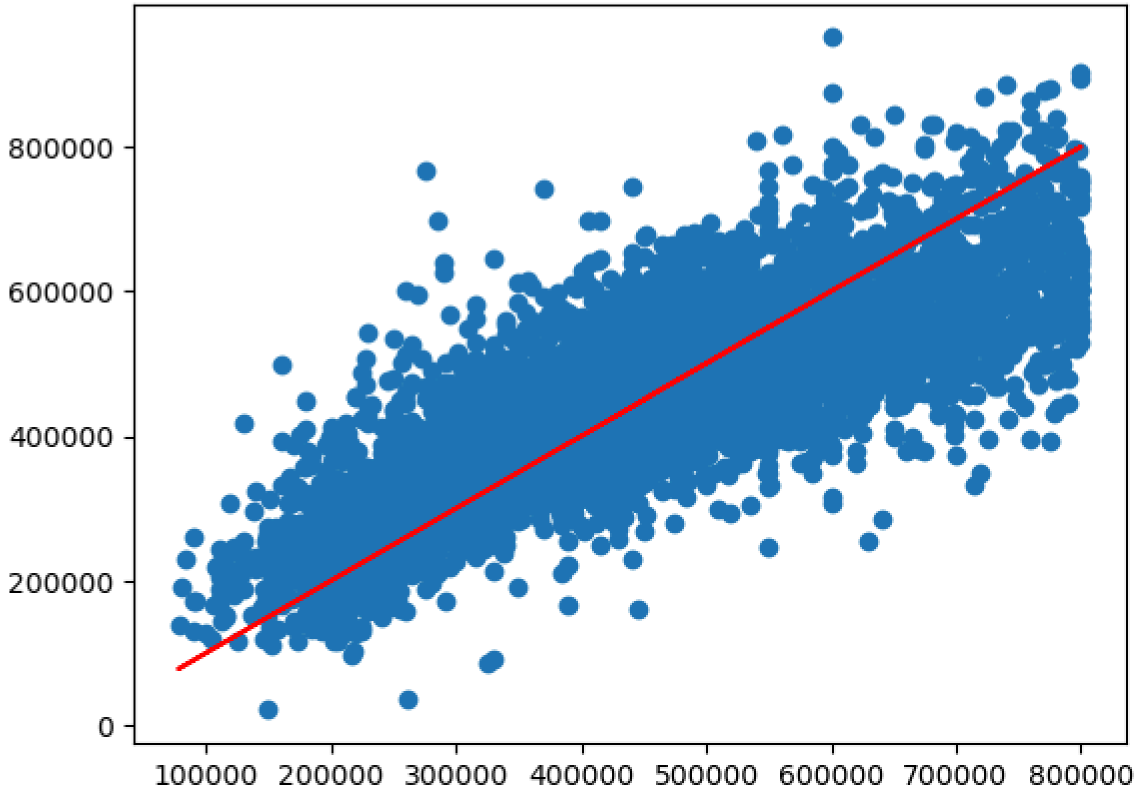
Out[121…
```
540296.6
```

In [122…
```
#Best possible score is 1.0, lower values are worse.
explained_variance_score(y_test, predictions)
```

Out[122…
```
0.6470470589748937
```

In [123…
```
plt.scatter(y_test, predictions)
plt.plot(y_test, y_test, 'r')
```

Out[123…
```
[<matplotlib.lines.Line2D at 0x115b4fddaf0>]
```



In [124…
```
# The below are the only features of new house in the market
single_house = df.drop('price', axis=1).iloc[0]
```

In [125…
```
single_house = scaler.transform(single_house.values.reshape(-1,19))
```

```
C:\learnings\envs\deeplearning\lib\site-packages\sklearn\base.py:450: UserWarnin
g: X does not have valid feature names, but MinMaxScaler was fitted with feature
names
  warnings.warn(
```

In [126…

```
model.predict(single_house)
```

```
1/1 [==============================] - 0s 21ms/step
```

Out[126…

```
array([[293580.25]], dtype=float32)
```

In [127…

```
df.head()
```

Out[127…

	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	conc
0	221900.0	3	1.00	1180	5650	1.0	0	0	
1	538000.0	3	2.25	2570	7242	2.0	0	0	
2	180000.0	2	1.00	770	10000	1.0	0	0	
3	604000.0	4	3.00	1960	5000	1.0	0	0	
4	510000.0	3	2.00	1680	8080	1.0	0	0	

In [ ]: