In [1]:

```
import pandas as pd
```

In [2]:

```
import numpy as np
```

In [3]:

```
import seaborn as sns
```

In [4]:

```
import matplotlib.pyplot as plt

%matplotlib inline
```

In [5]:

```
WineDF =pd.read_csv("winequality-red.csv")
```

In [6]:

```
WineDF.head()
```

Out[6]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alco
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	
4	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	

In [7]:

```
WineDF.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1599 entries, 0 to 1598
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   fixed acidity         1599 non-null   float64
 1   volatile acidity      1599 non-null   float64
 2   citric acid           1599 non-null   float64
 3   residual sugar        1599 non-null   float64
 4   chlorides             1599 non-null   float64
 5   free sulfur dioxide   1599 non-null   float64
 6   total sulfur dioxide  1599 non-null   float64
 7   density               1599 non-null   float64
 8   pH                    1599 non-null   float64
 9   sulphates             1599 non-null   float64
 10  alcohol               1599 non-null   float64
 11  quality               1599 non-null   int64  
dtypes: float64(11), int64(1)
memory usage: 150.0 KB
```

In [8]:

```
WineDF
```

Out[8]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	a
0	7.4	0.700	0.00	1.9	0.076	11.0	34.0	0.99780	3.51	0.56	
1	7.8	0.880	0.00	2.6	0.098	25.0	67.0	0.99680	3.20	0.68	
2	7.8	0.760	0.04	2.3	0.092	15.0	54.0	0.99700	3.26	0.65	
3	11.2	0.280	0.56	1.9	0.075	17.0	60.0	0.99800	3.16	0.58	
4	7.4	0.700	0.00	1.9	0.076	11.0	34.0	0.99780	3.51	0.56	
...	...	...	...	...	...	...	...	...	...	...	
1594	6.2	0.600	0.08	2.0	0.090	32.0	44.0	0.99490	3.45	0.58	
1595	5.9	0.550	0.10	2.2	0.062	39.0	51.0	0.99512	3.52	0.76	
1596	6.3	0.510	0.13	2.3	0.076	29.0	40.0	0.99574	3.42	0.75	
1597	5.9	0.645	0.12	2.0	0.075	32.0	44.0	0.99547	3.57	0.71	
1598	6.0	0.310	0.47	3.6	0.067	18.0	42.0	0.99549	3.39	0.66	

1599 rows × 12 columns

In [9]:

```
WineDF.describe()
```

Out[9]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total di
count	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.0
mean	8.319637	0.527821	0.270976	2.538806	0.087467	15.874922	46.4
std	1.741096	0.179060	0.194801	1.409928	0.047065	10.460157	32.8
min	4.600000	0.120000	0.000000	0.900000	0.012000	1.000000	6.0
25%	7.100000	0.390000	0.090000	1.900000	0.070000	7.000000	22.0
50%	7.900000	0.520000	0.260000	2.200000	0.079000	14.000000	38.0
75%	9.200000	0.640000	0.420000	2.600000	0.090000	21.000000	62.0
max	15.900000	1.580000	1.000000	15.500000	0.611000	72.000000	289.0

In [10]:

```
WineDF.columns
```

Out[10]:

```
Index(['fixed acidity', 'volatile acidity', 'citric acid', 'residual suga
r',
       'chlorides', 'free sulfur dioxide', 'total sulfur dioxide', 'densit
y',
       'pH', 'sulphates', 'alcohol', 'quality'],
      dtype='object')
```

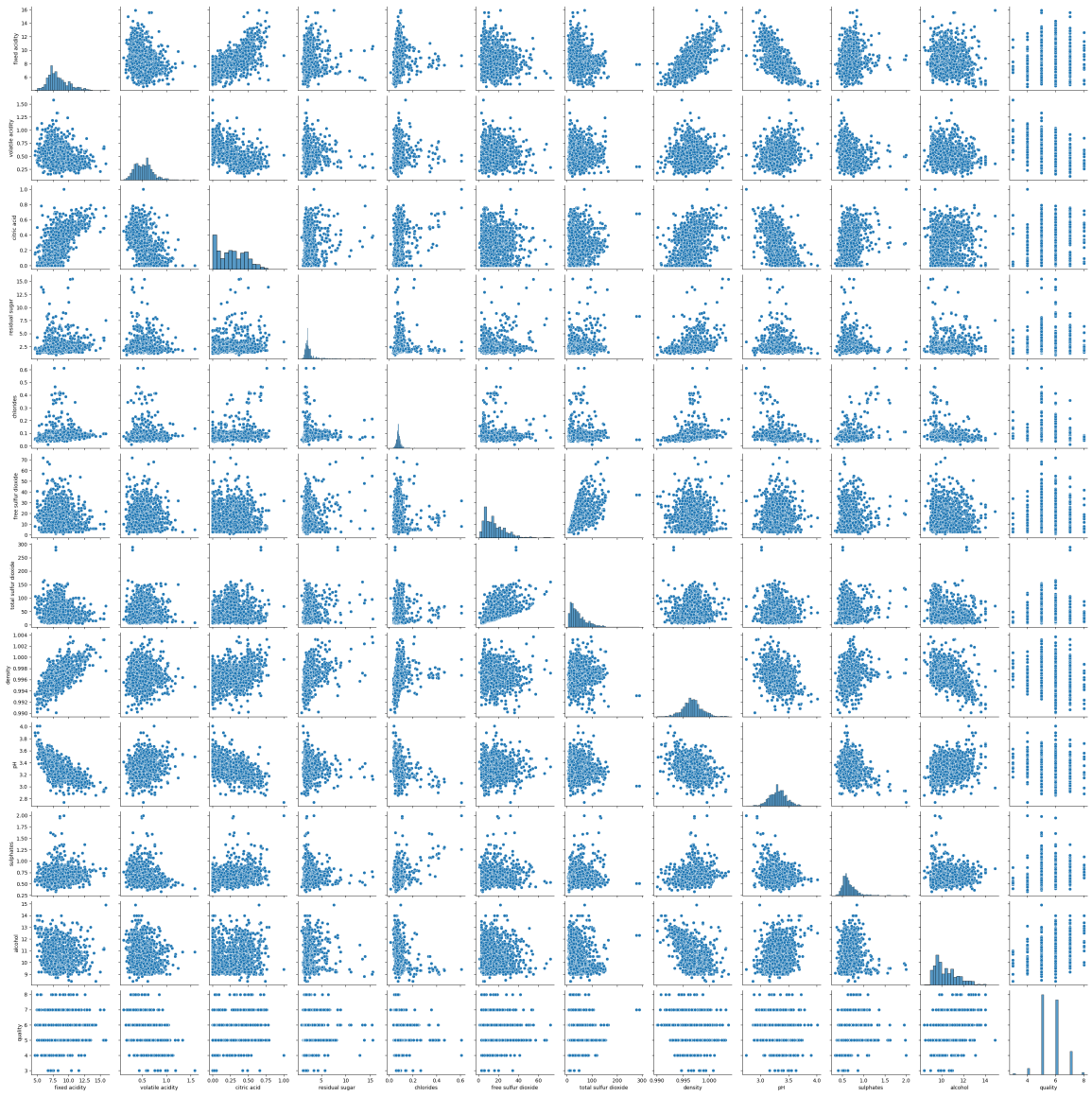
In [11]:

```
sns.pairplot(WineDF)
```

```
C:\Users\DIVYA\AppData\Local\Programs\Python\Python39\lib\site-packages\se
aborn\axisgrid.py:118: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

Out[11]:

```
<seaborn.axisgrid.PairGrid at 0x1c8209e18b0>
```

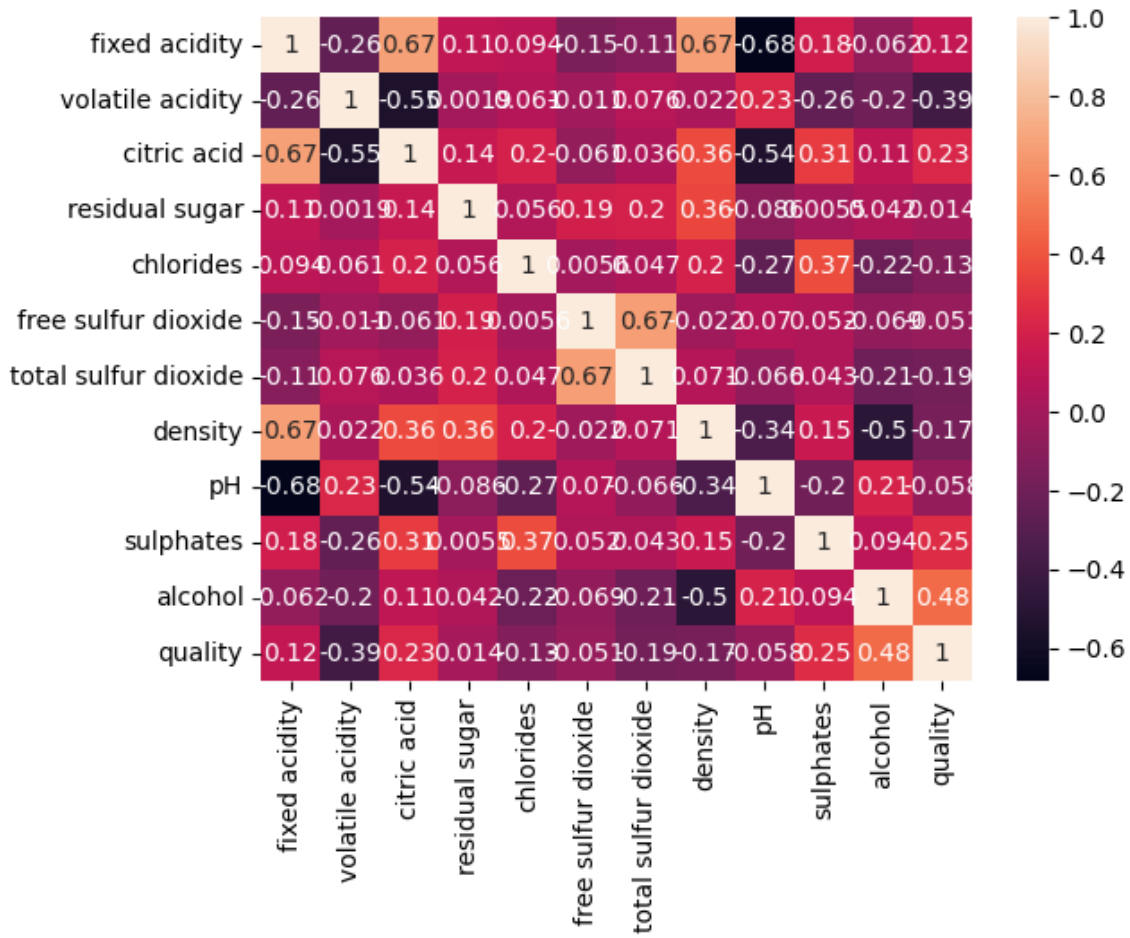


In [12]:

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

Out[12]:

```
<Axes: >
```



In [14]:

```
X=WineDF[['fixed acidity', 'volatile acidity', 'citric acid', 'residual sugar',
       'chlorides', 'free sulfur dioxide', 'total sulfur dioxide', 'density',
       'pH', 'sulphates', 'alcohol']]

y=WineDF['quality']
```

In [15]:

```
 from sklearn.model_selection import train_test_split
```

In [16]:

```
X_train, X_test, y_train, y_test = train_test_split(
...     X, y, test_size=0.40, random_state=101)
```

In [17]:

```
from sklearn.linear_model import LinearRegression
```

In [18]:

```
lm = LinearRegression()
```

In [19]:

```
lm.fit (X_train, y_train)
```

Out[19]:

LinearRegression
LinearRegression()

In [20]:

```
coeff_df = pd.DataFrame (lm.coef_, X.columns, columns=['Coefficient'])
```

In [21]:

```
coeff_df
```

Out[21]:

	Coefficient
fixed acidity	0.043117
volatile acidity	-1.209094
citric acid	-0.379646
residual sugar	0.013869
chlorides	-1.353134
free sulfur dioxide	0.001510
total sulfur dioxide	-0.003230
density	-7.177079
pH	-0.491494
sulphates	0.749241
alcohol	0.299338

In [22]:

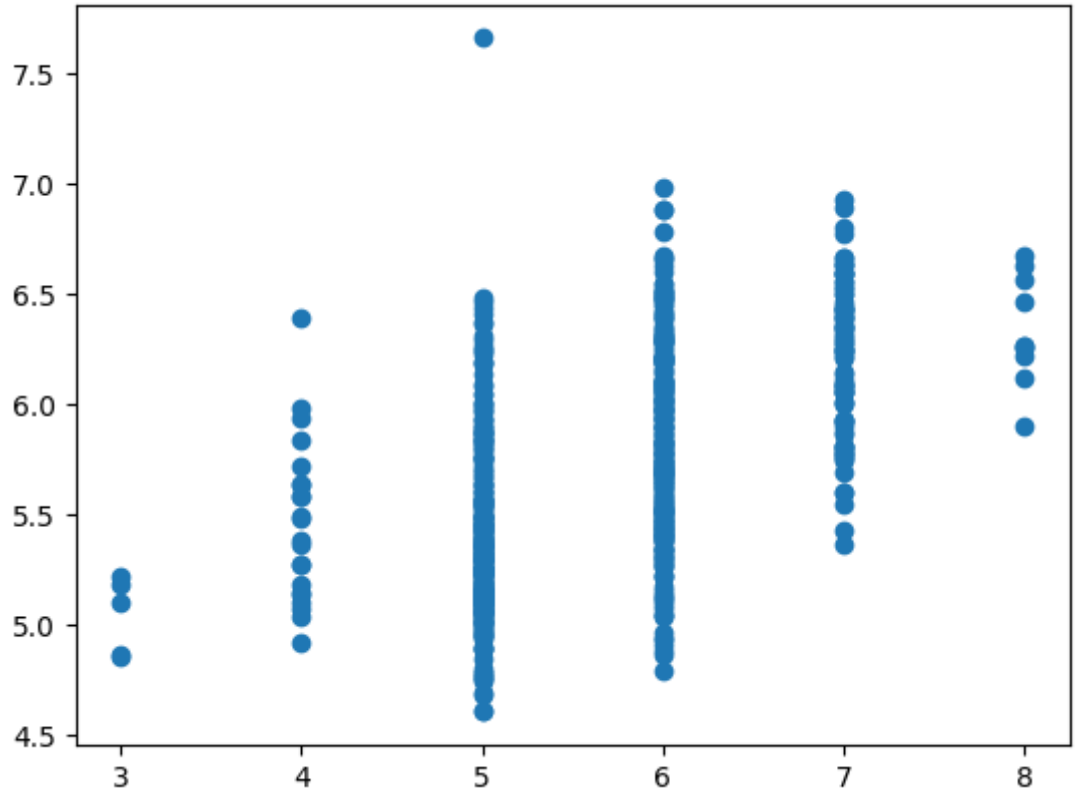
```
predictions = lm.predict (X_test)
```

In [23]:

```
plt.scatter (y_test, predictions)
```

Out[23]:

```
<matplotlib.collections.PathCollection at 0x1c842eb5670>
```



In [24]:

```
sns.distplot((y_test-predictions),bins=50);
```

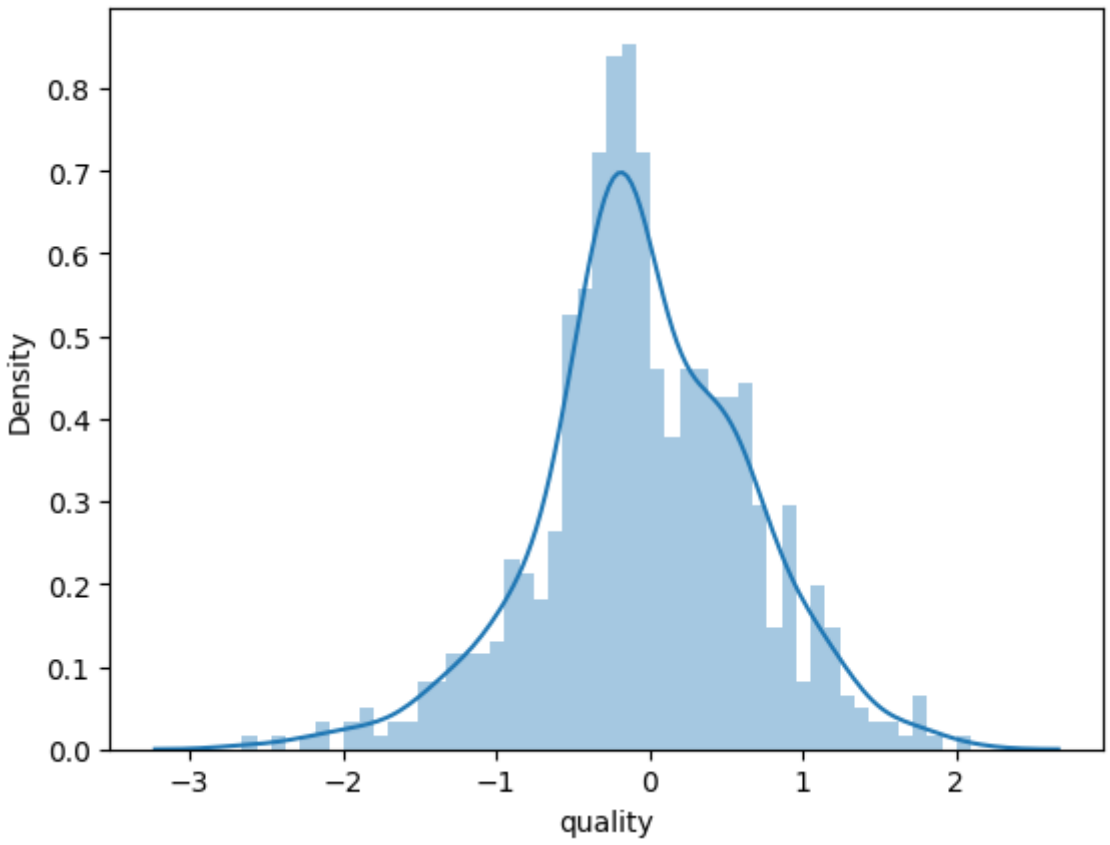
```
C:\Users\DIVYA\AppData\Local\Temp\ipykernel_8536\1326397652.py:1: UserWarn
ing:

`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 wi
th
similar flexibility) or `histplot` (an axes-level function for histogram
s).

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

  sns.distplot((y_test-predictions),bins=50);
```



In [ ]: