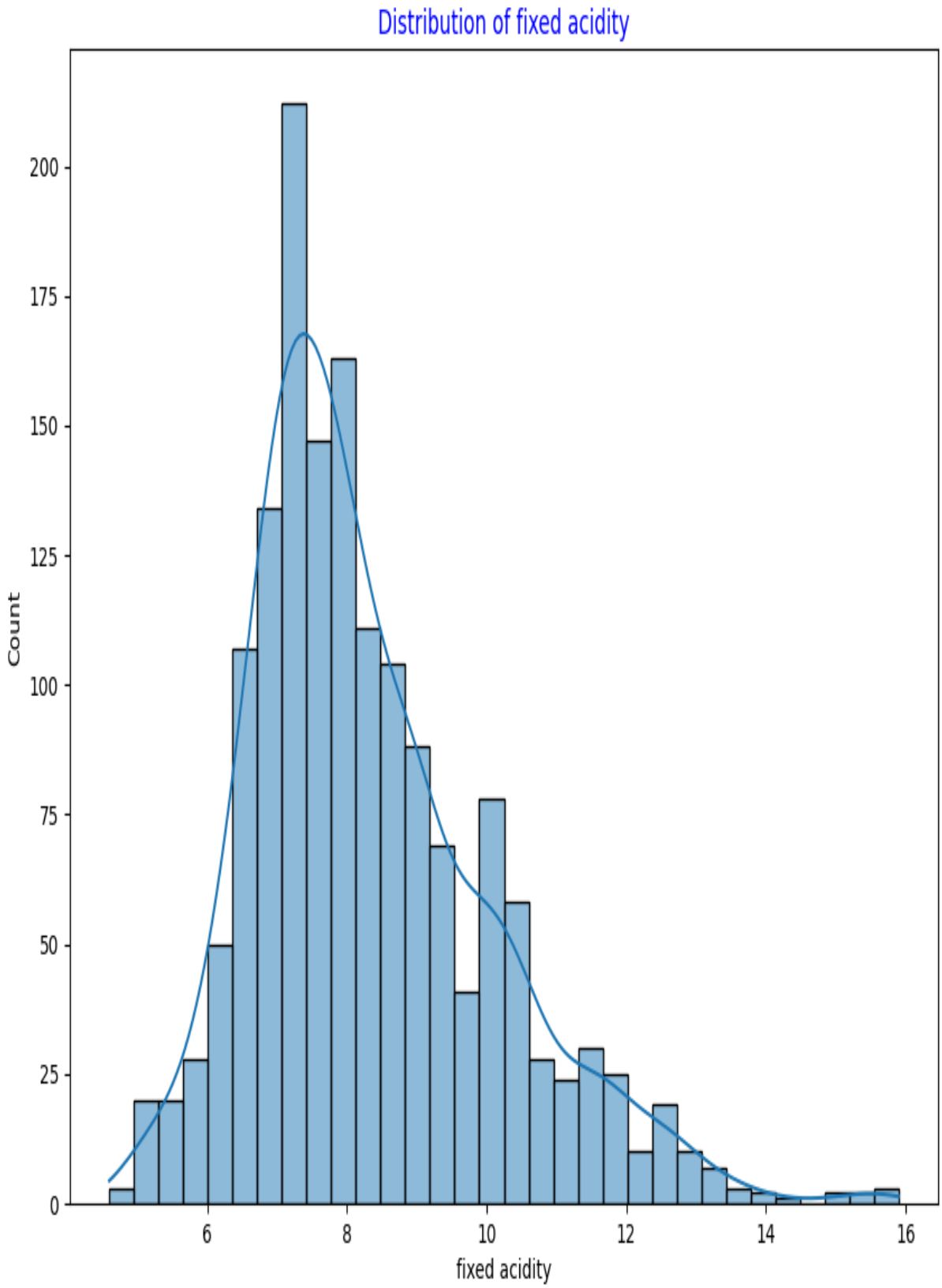
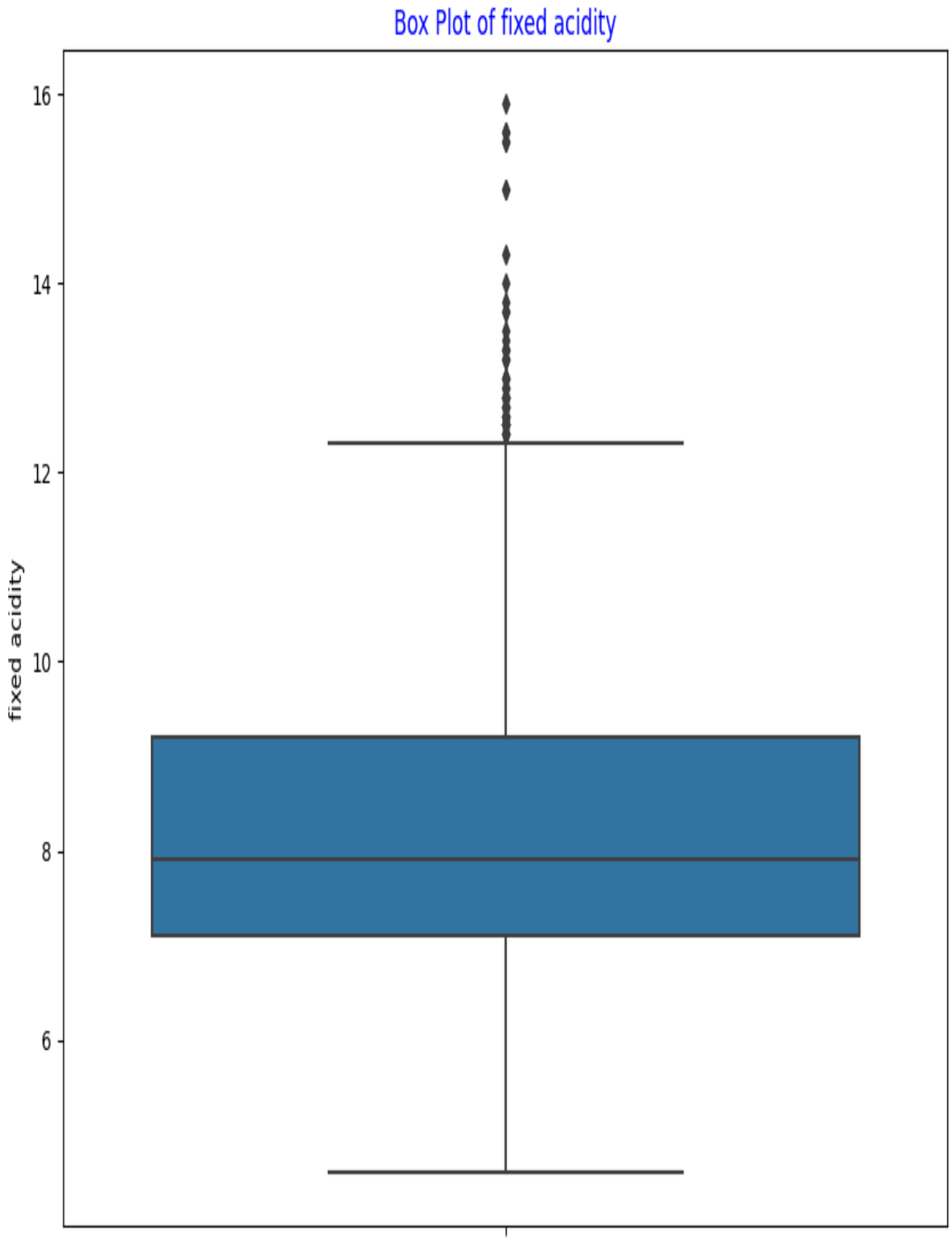
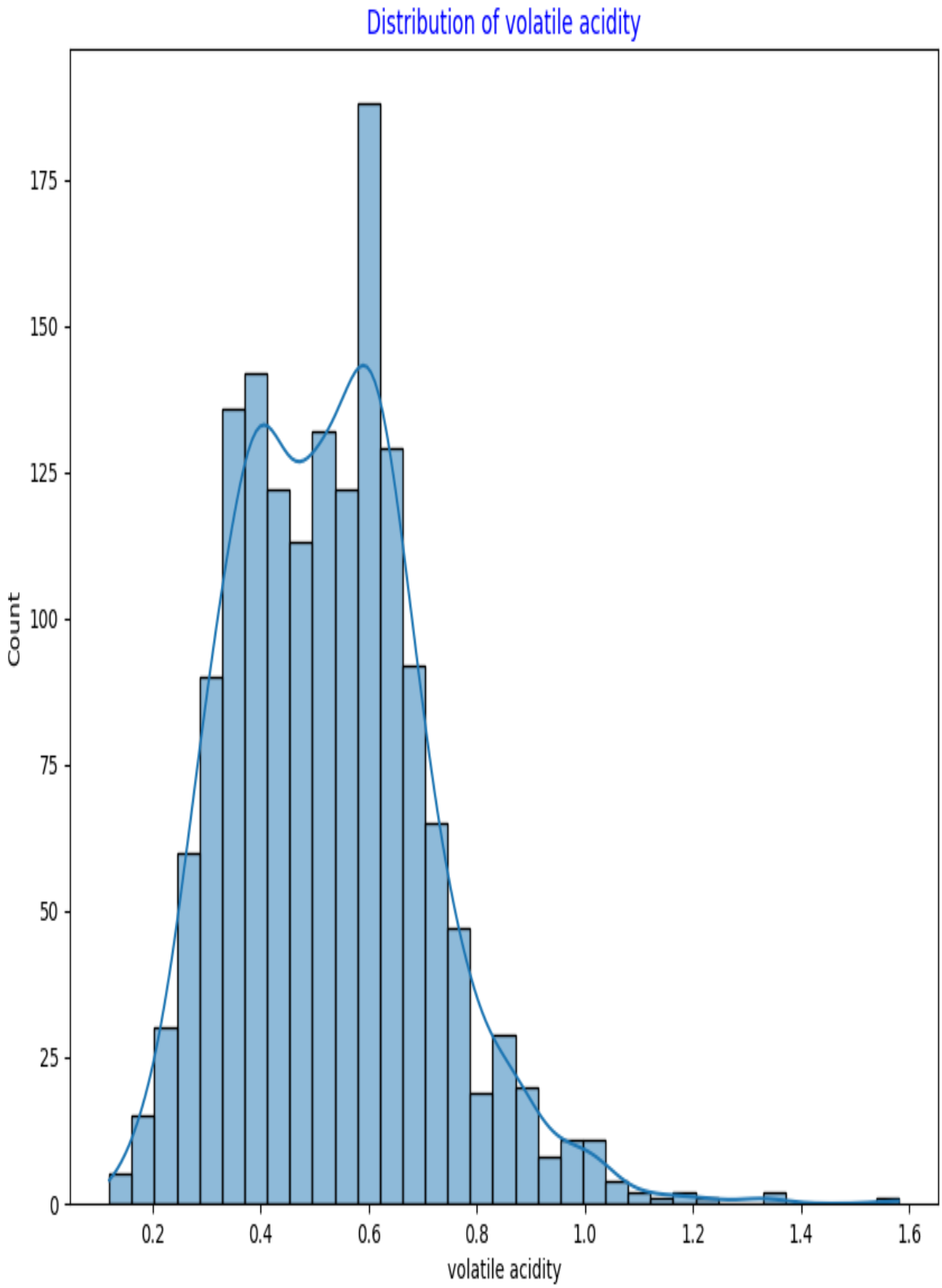
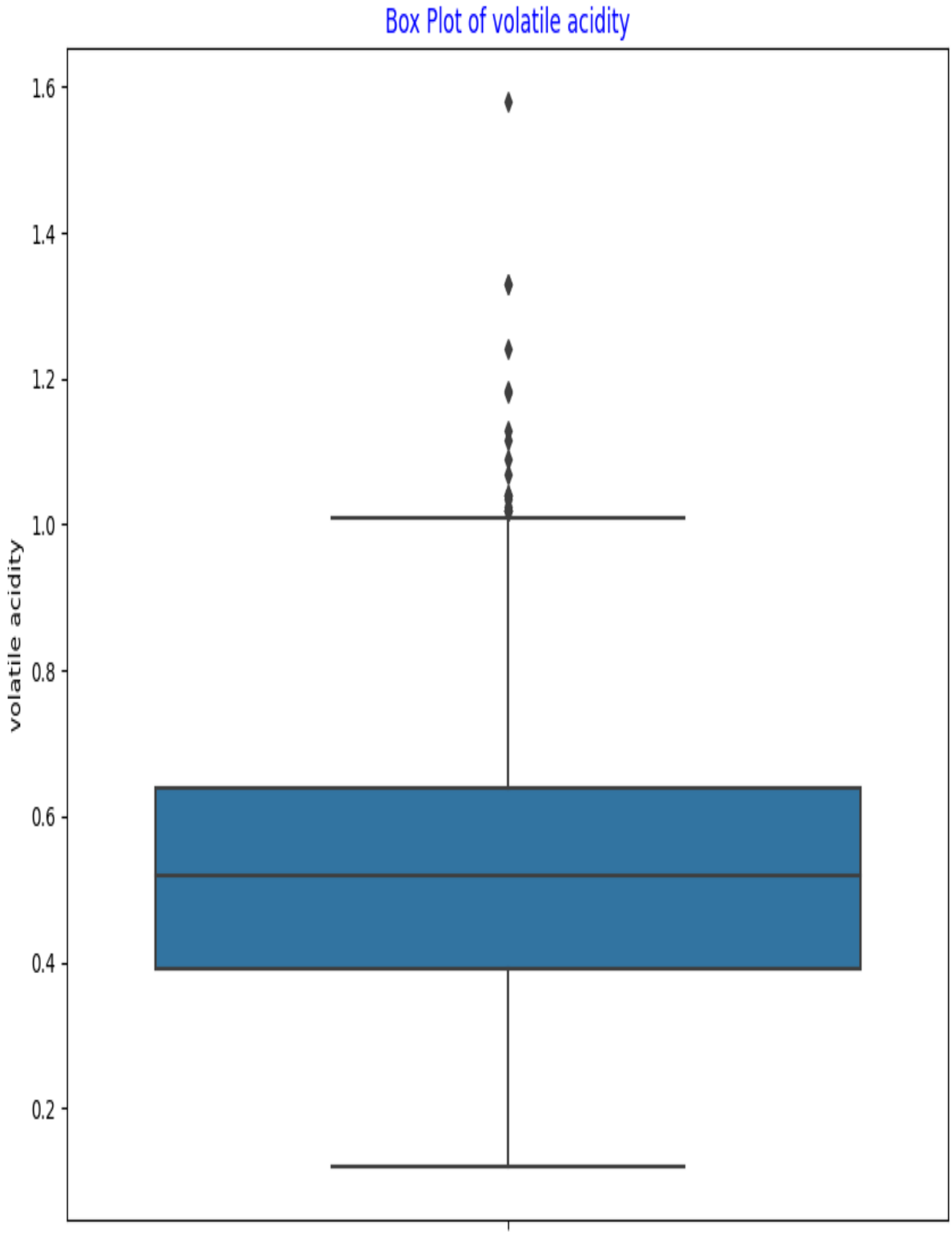
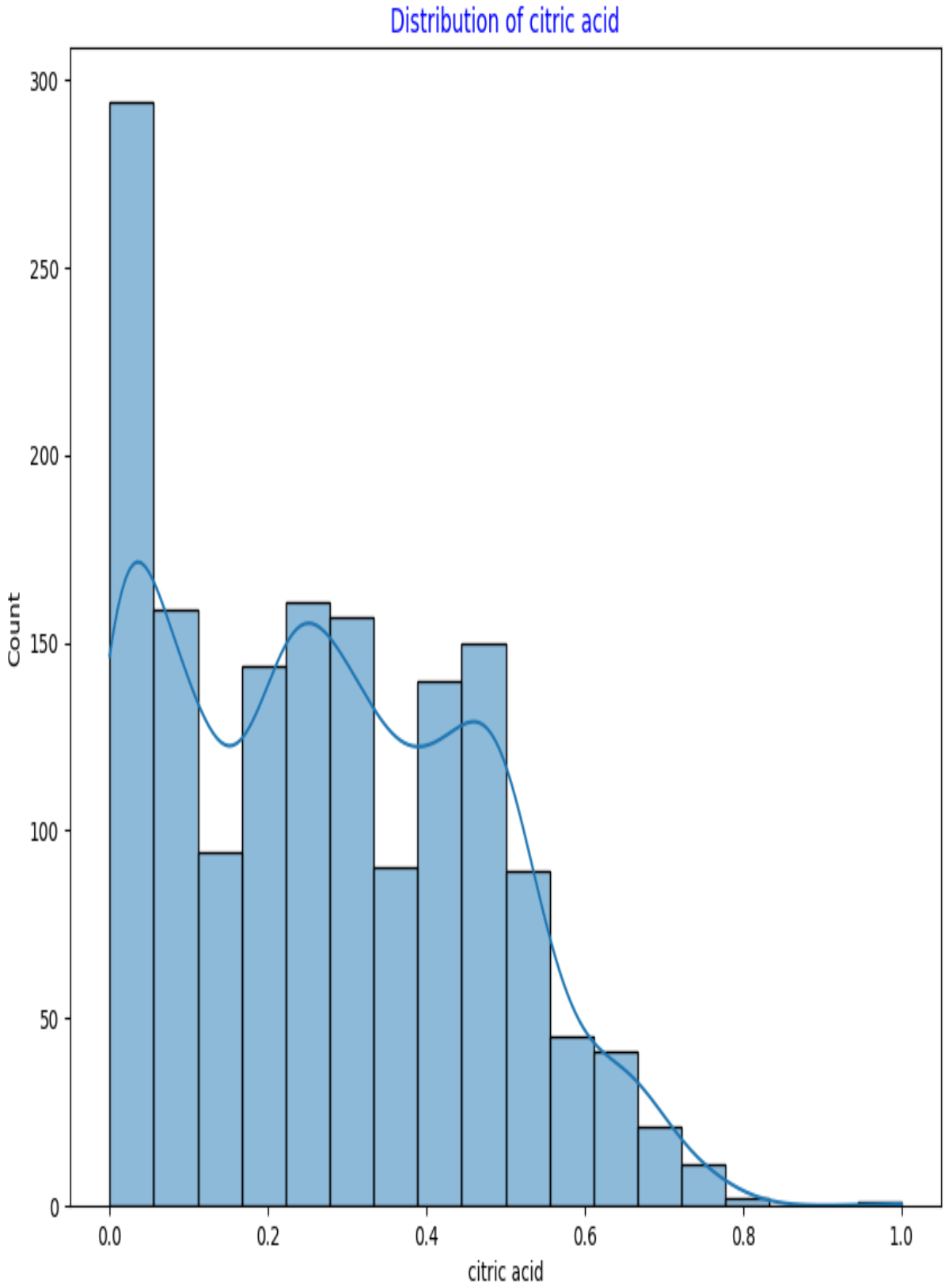
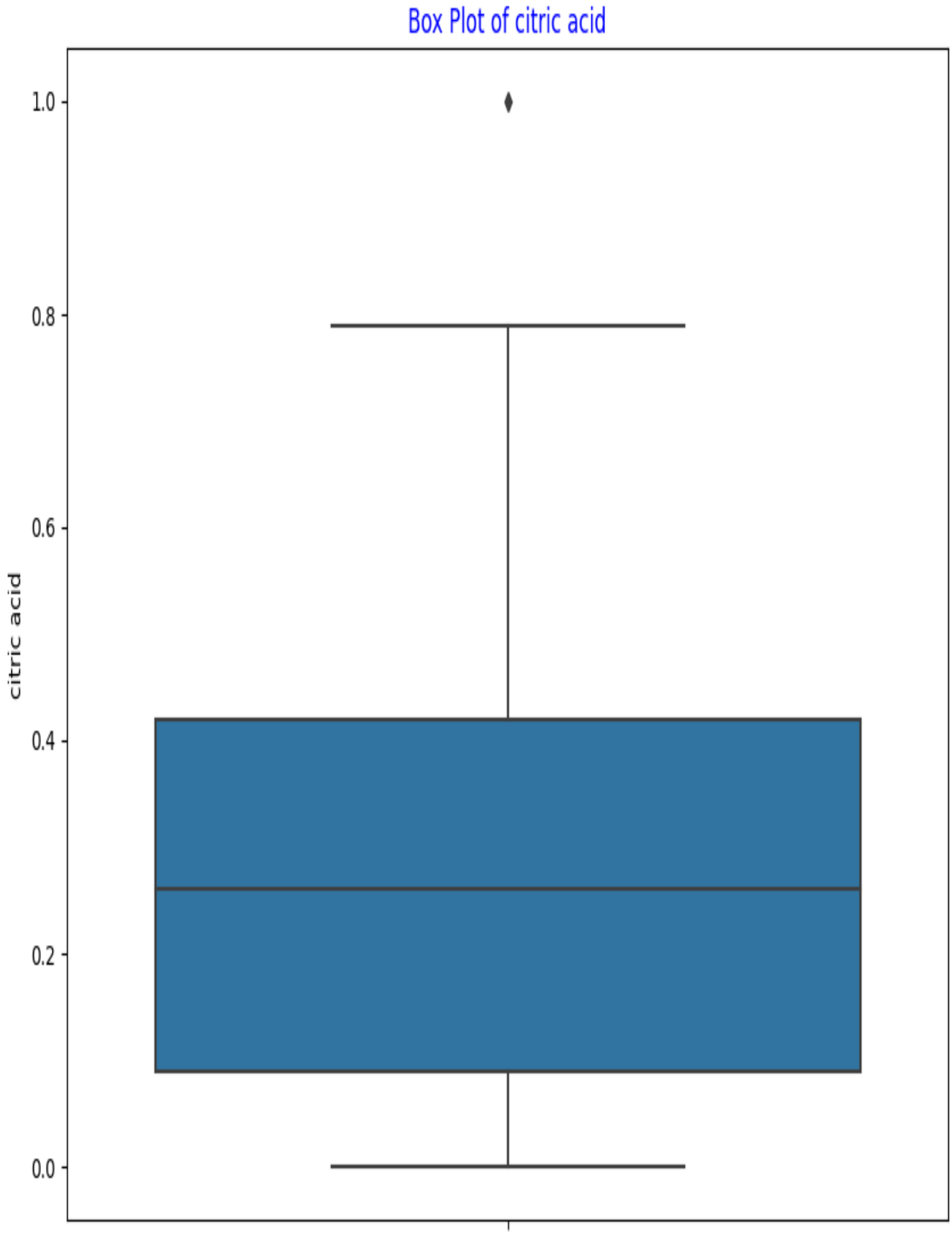

Distribution of fixed acidity
Count
fixed acidity
0
25
50
75
100
125
150
175
200
6
8
10
12
14
16

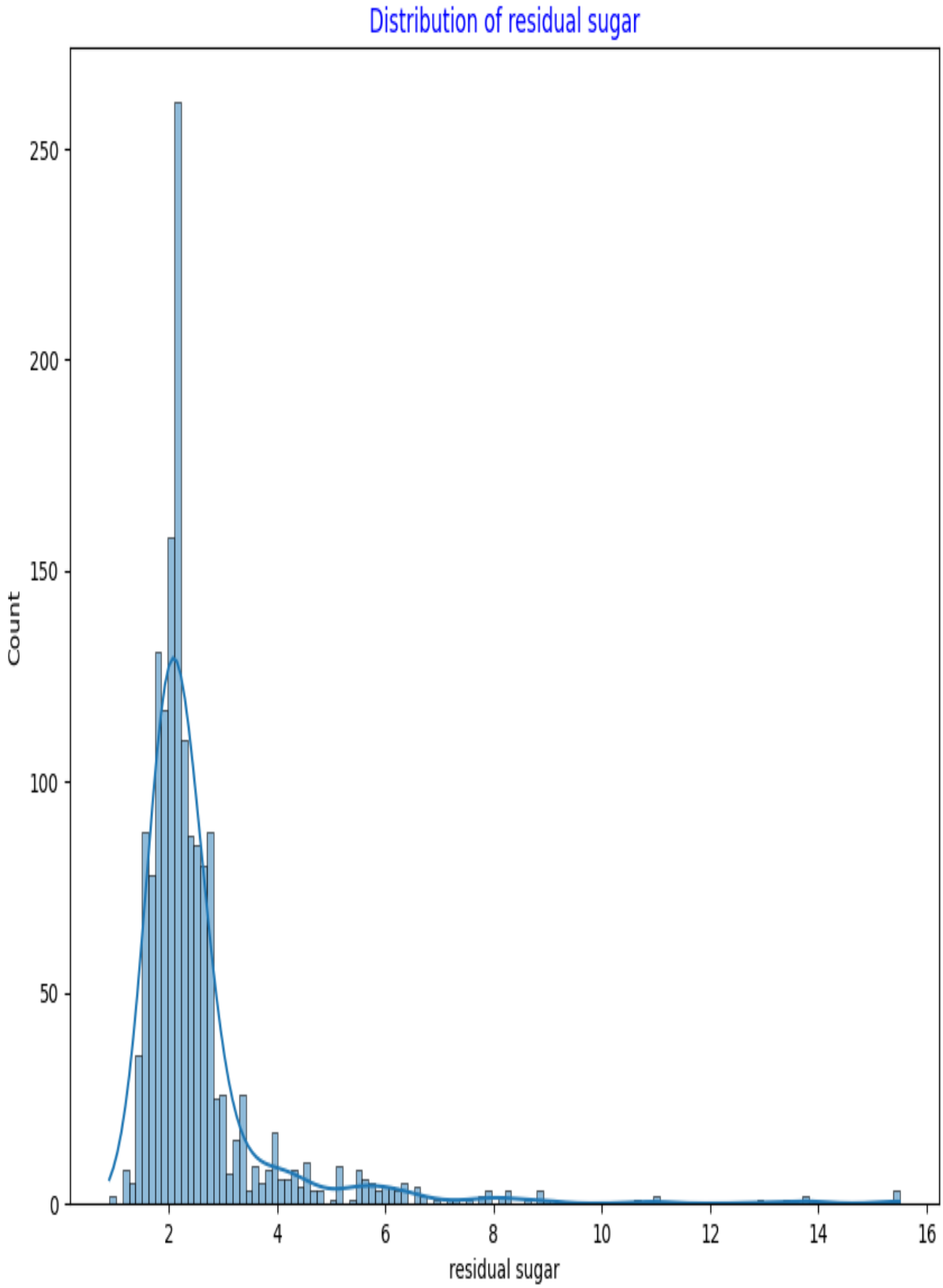

Box Plot of fixed acidity
fixed acidity
16
14
12
10
8
6

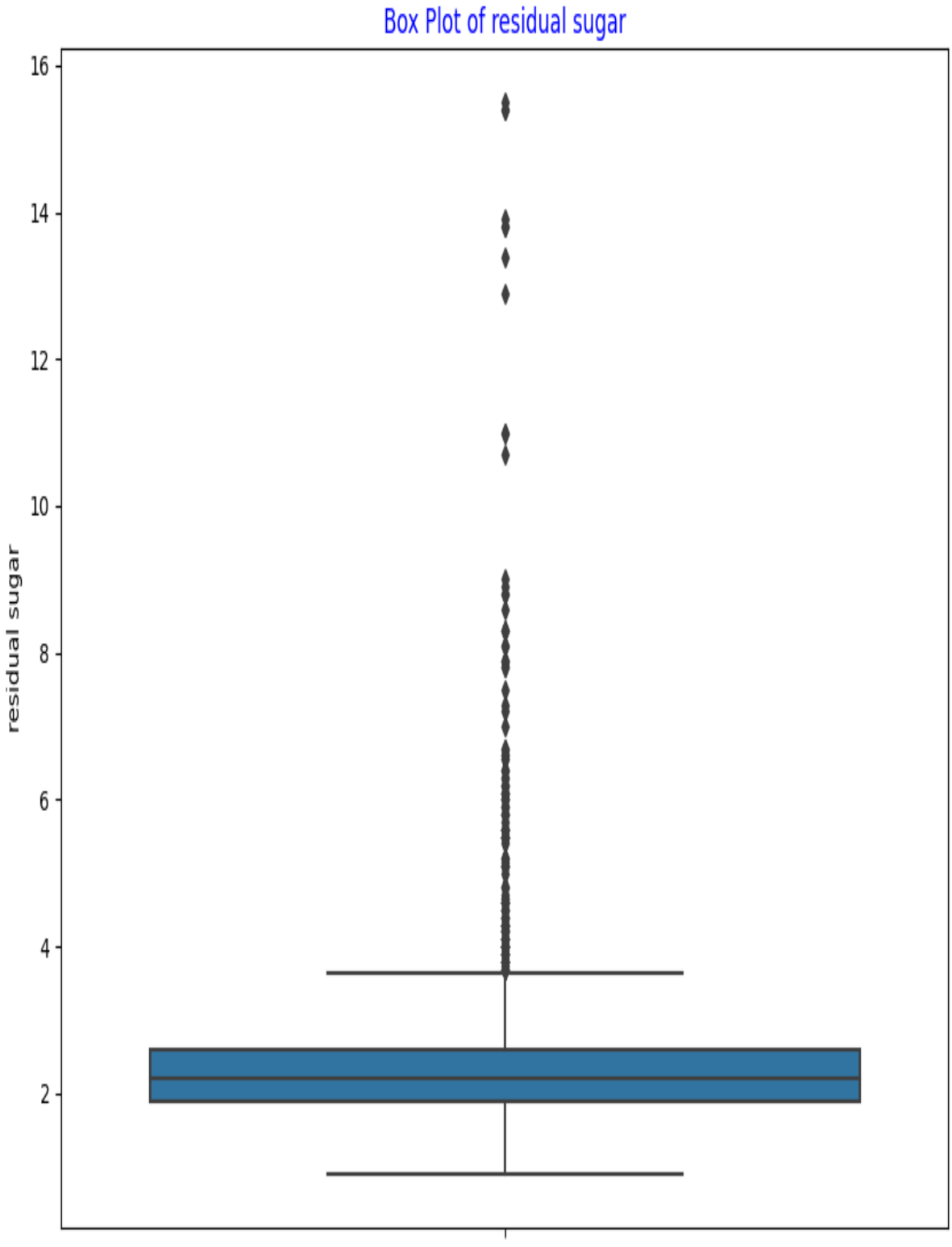

Distribution of volatile acidity
Count
volatile acidity
0
25
50
75
100
125
150
175
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

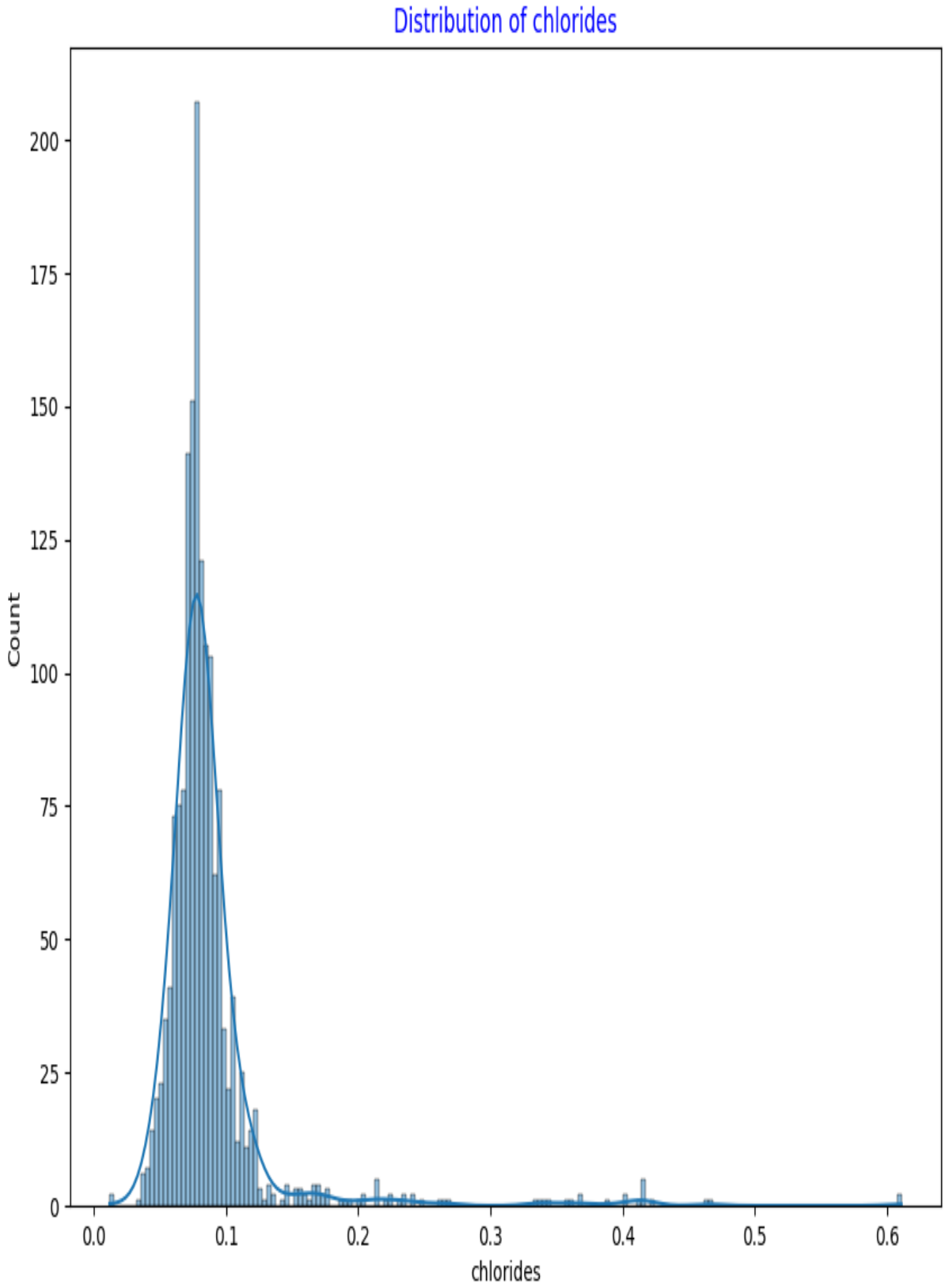

Box Plot of volatile acidity
volatile acidity
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2

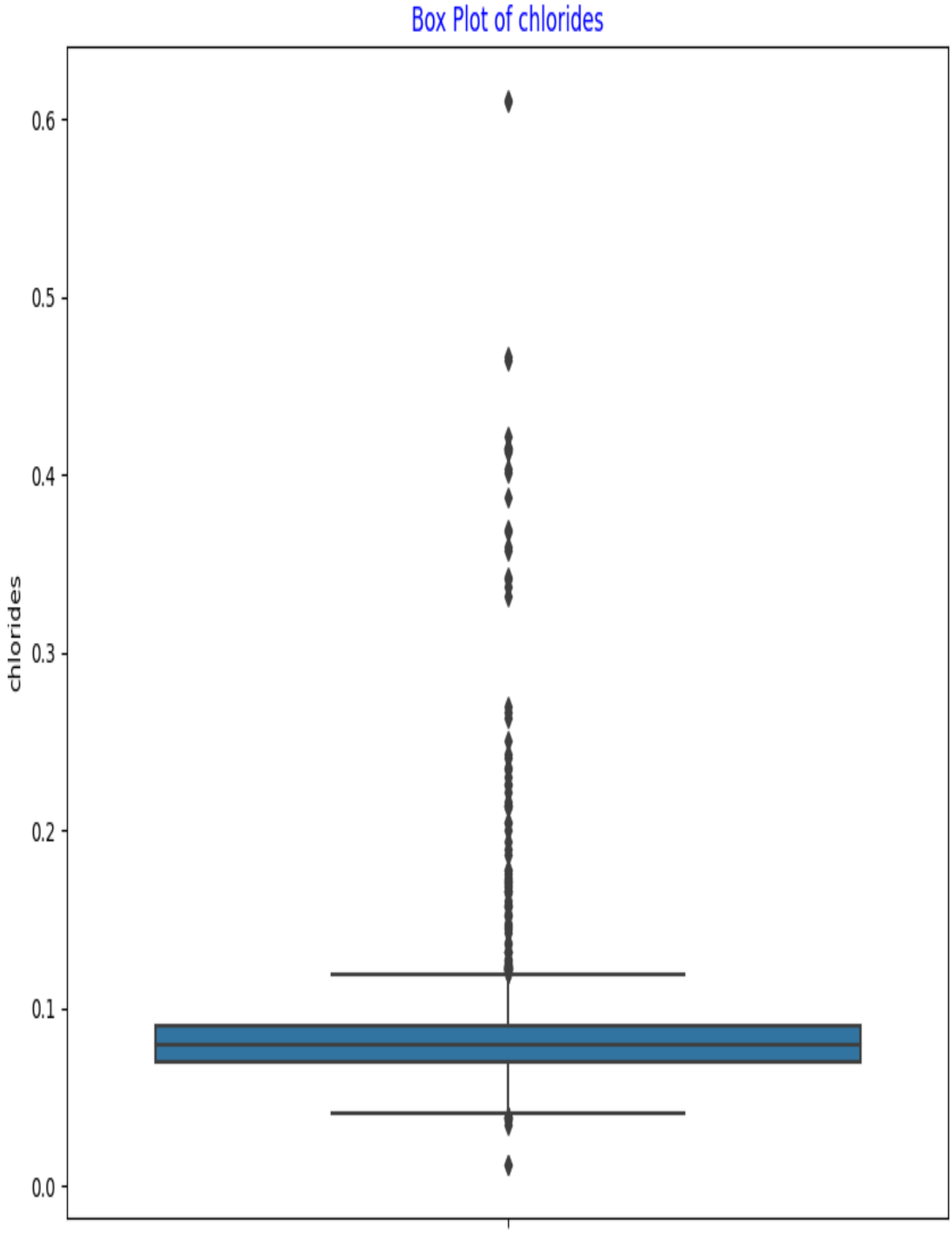

Distribution of citric acid
Count
citric acid
0
50
100
150
200
250
300
0.0
0.2
0.4
0.6
0.8
1.0

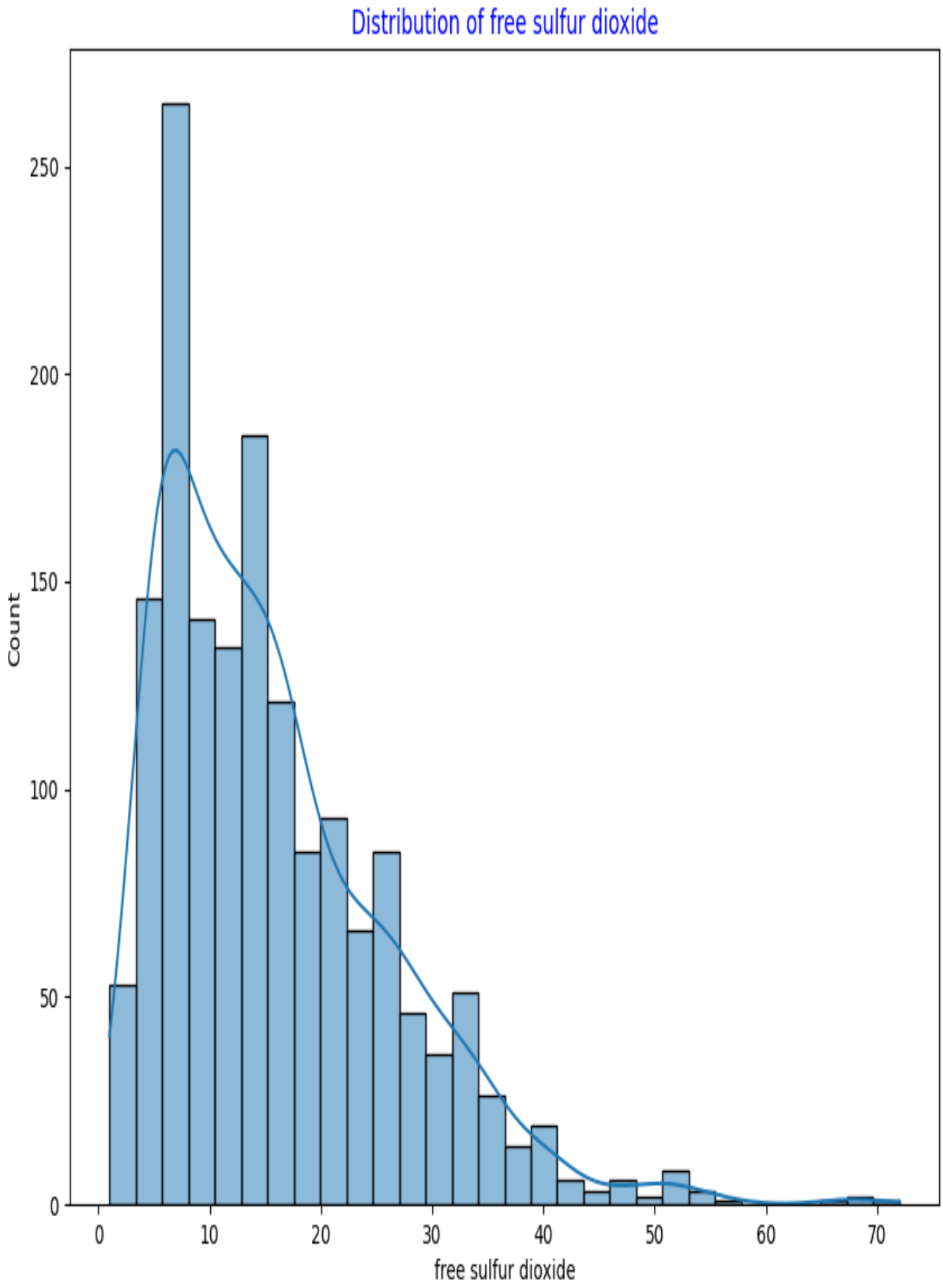

Box Plot of citric acid
citric acid
1.0
0.8
0.6
0.4
0.2
0.0

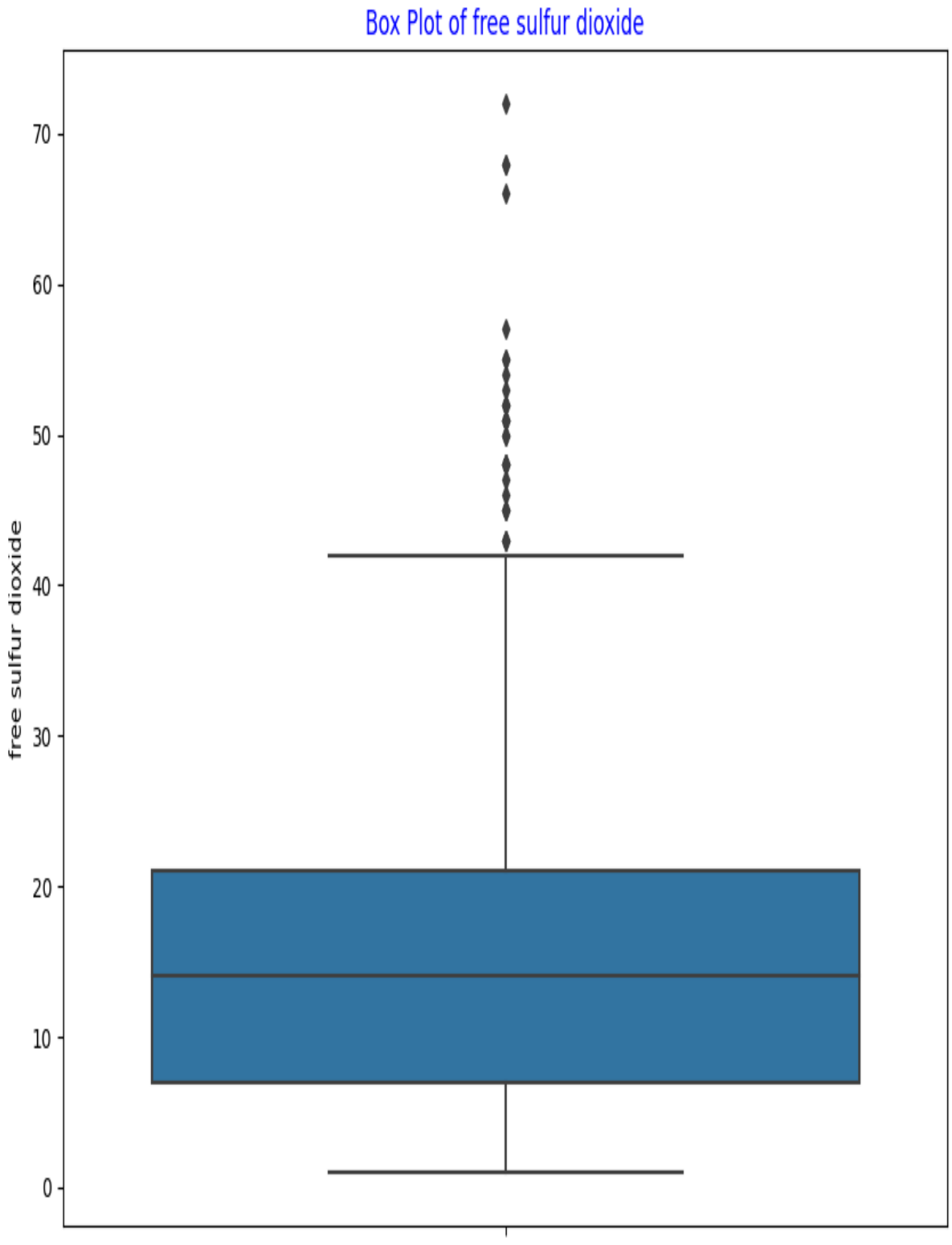

Distribution of residual sugar
Count
residual sugar
0
50
100
150
200
250
2
4
6
8
10
12
14
16

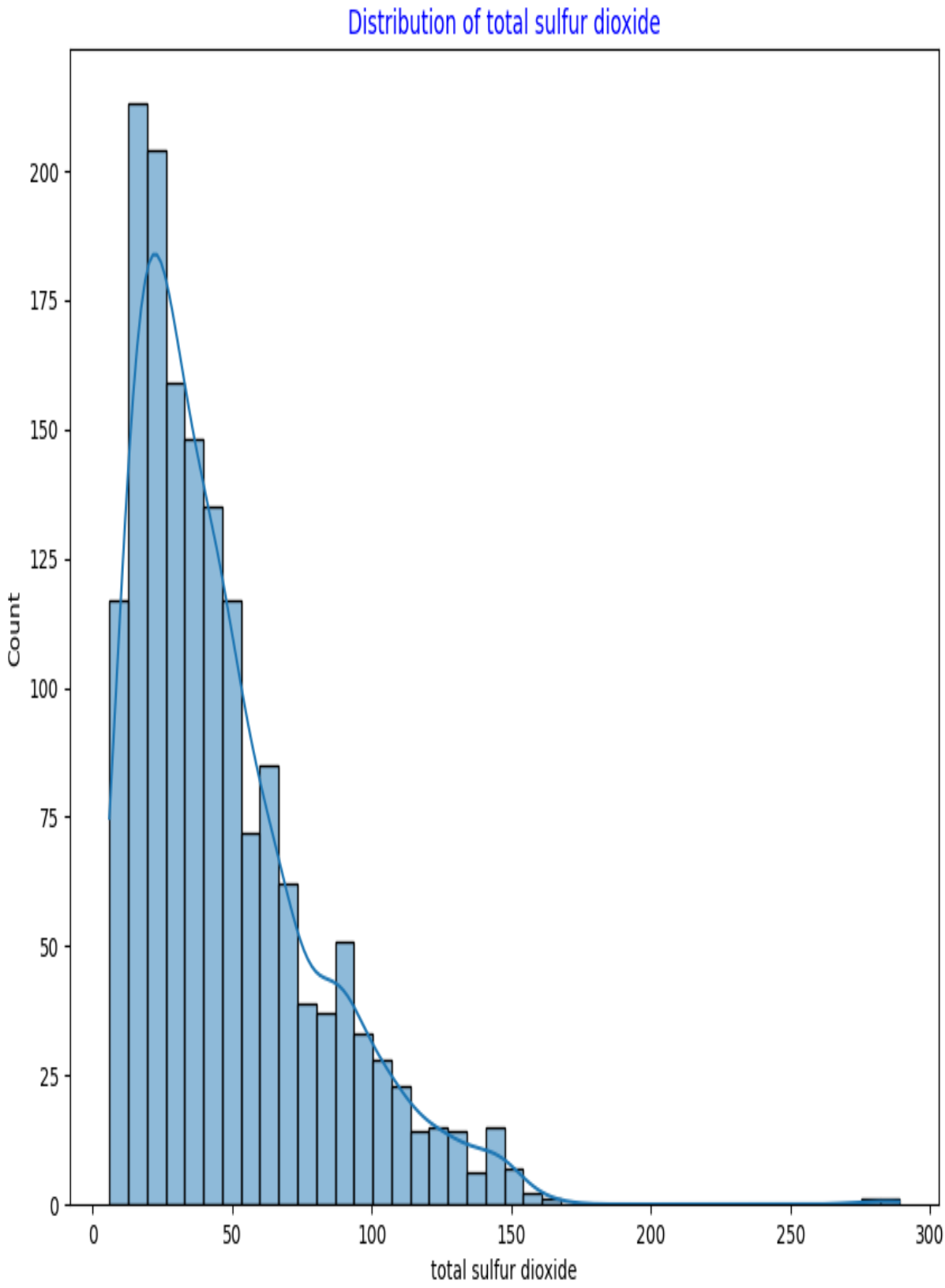

Box Plot of residual sugar
residual sugar
16
14
12
10
8
6
4
2

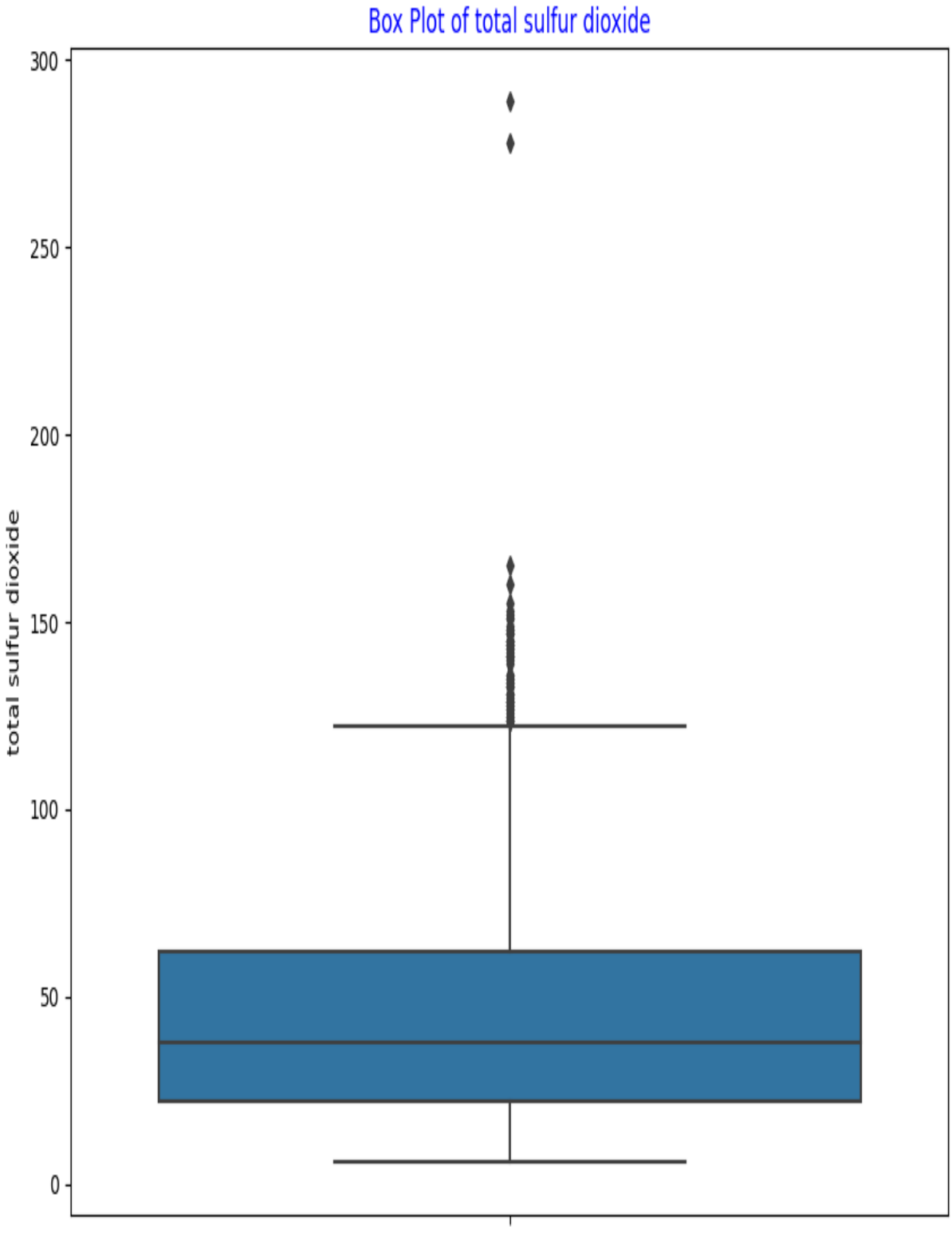

Distribution of chlorides
Count
chlorides
0
25
50
75
100
125
150
175
200
0.0
0.1
0.2
0.3
0.4
0.5
0.6

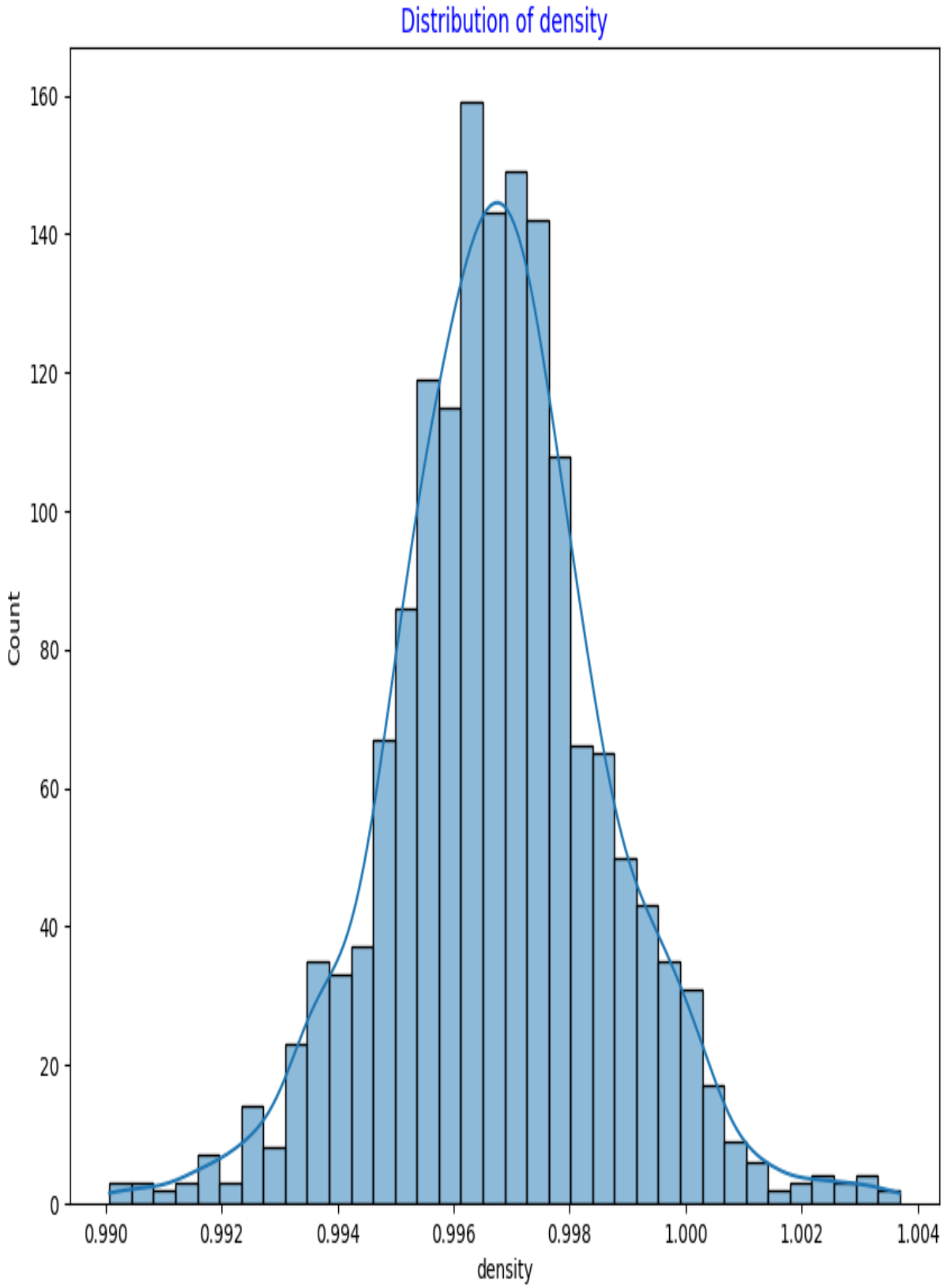

Box Plot of chlorides
chlorides
0.6
0.5
0.4
0.3
0.2
0.1
0.0

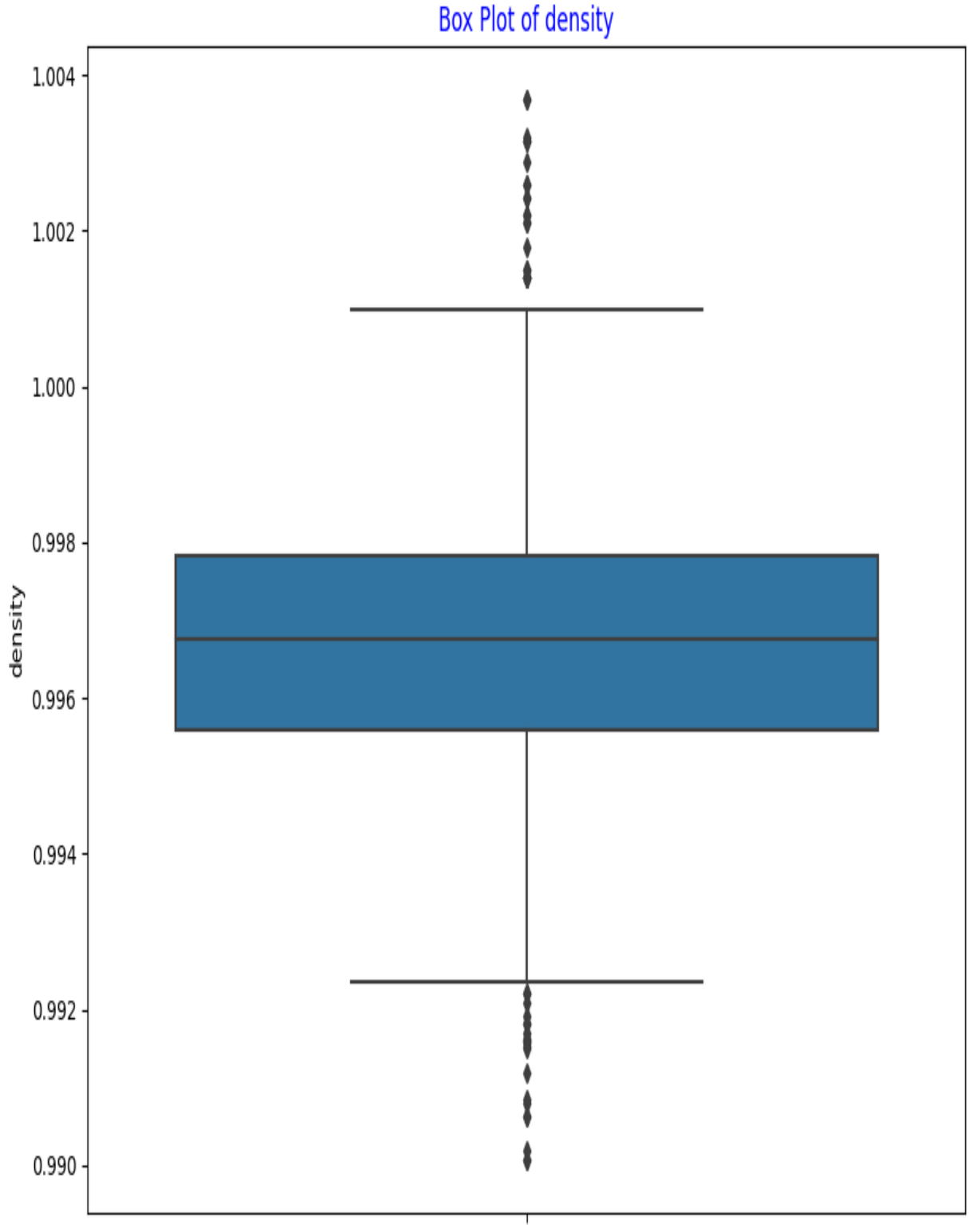

Distribution of free sulfur dioxide
Count
0
50
100
150
200
250
0
10
20
30
40
50
60
70
free sulfur dioxide

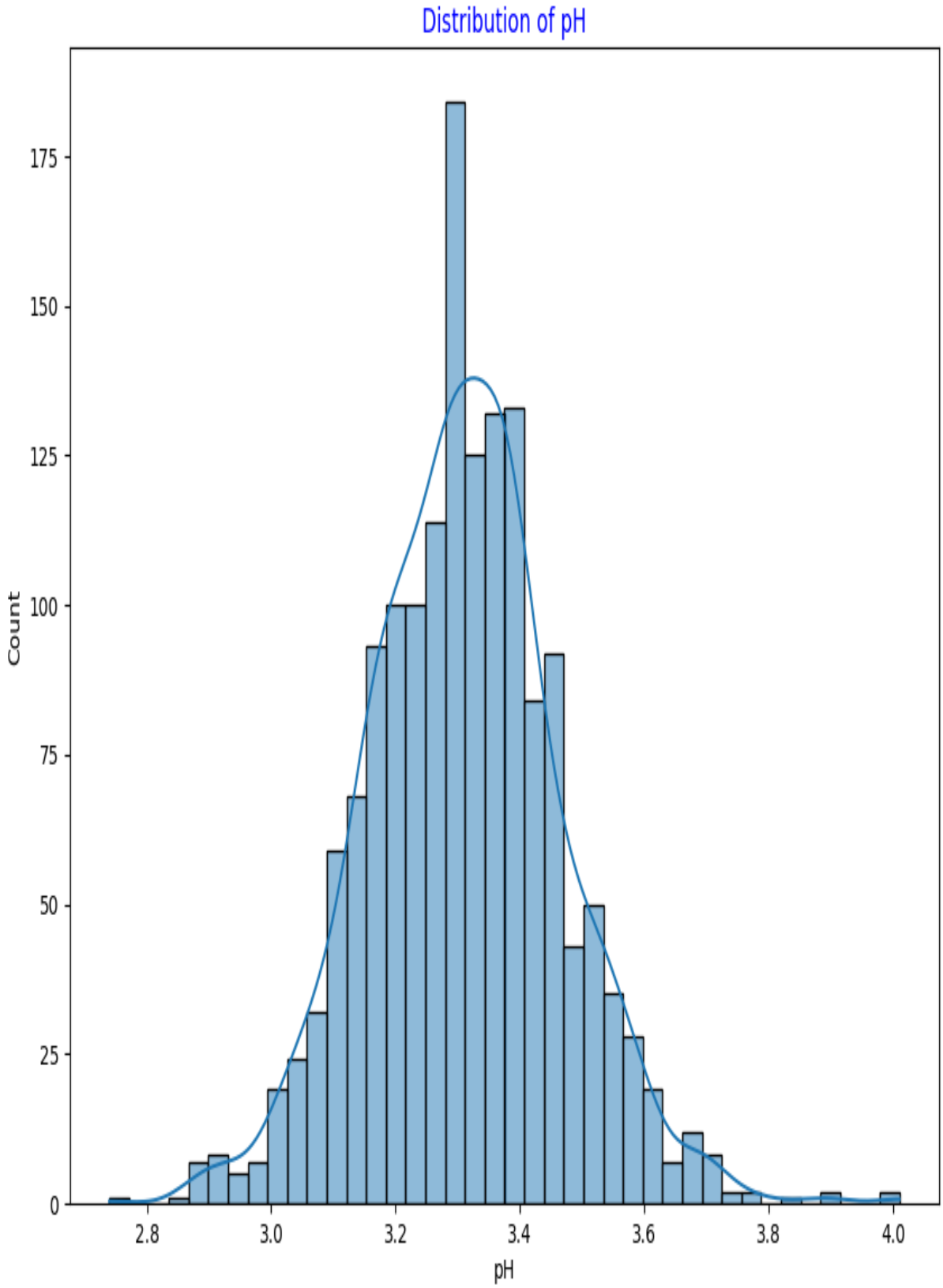

Box Plot of free sulfur dioxide
free sulfur dioxide
70
60
50
40
30
20
10
0

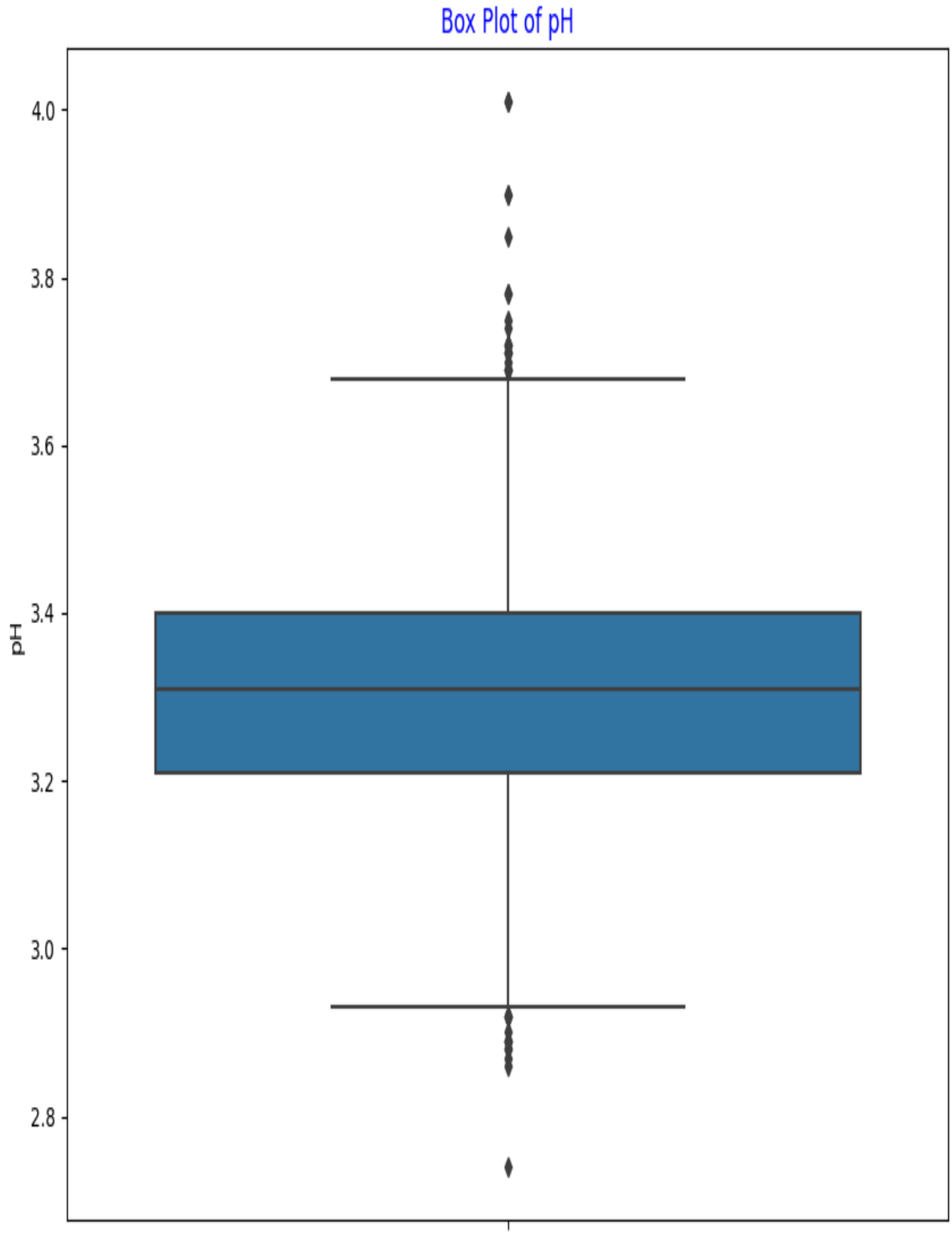

Distribution of total sulfur dioxide
Count
0
25
50
75
100
125
150
175
200
0
50
100
150
200
250
300
total sulfur dioxide

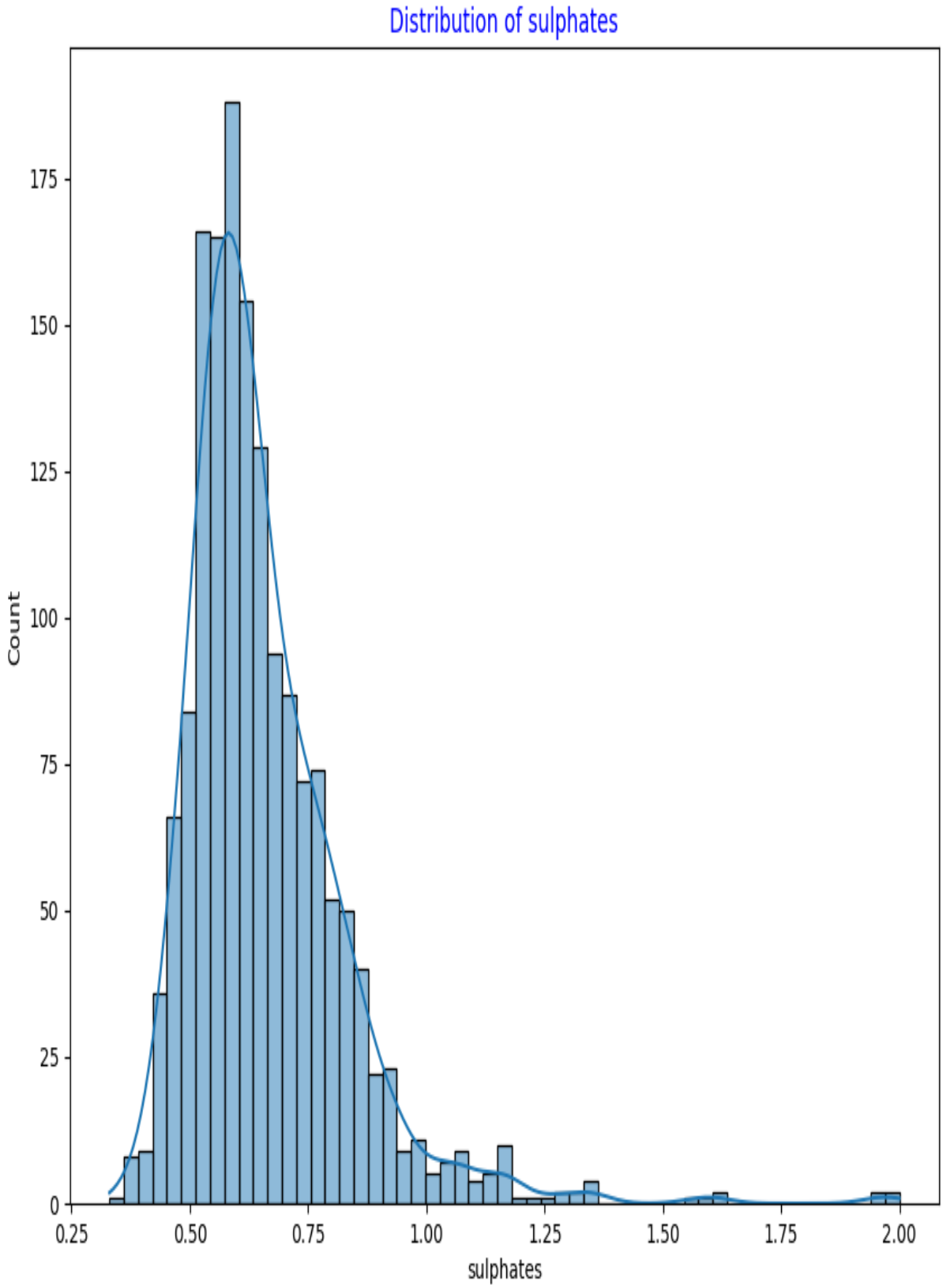

Box Plot of total sulfur dioxide
total sulfur dioxide
300
250
200
150
100
50
0

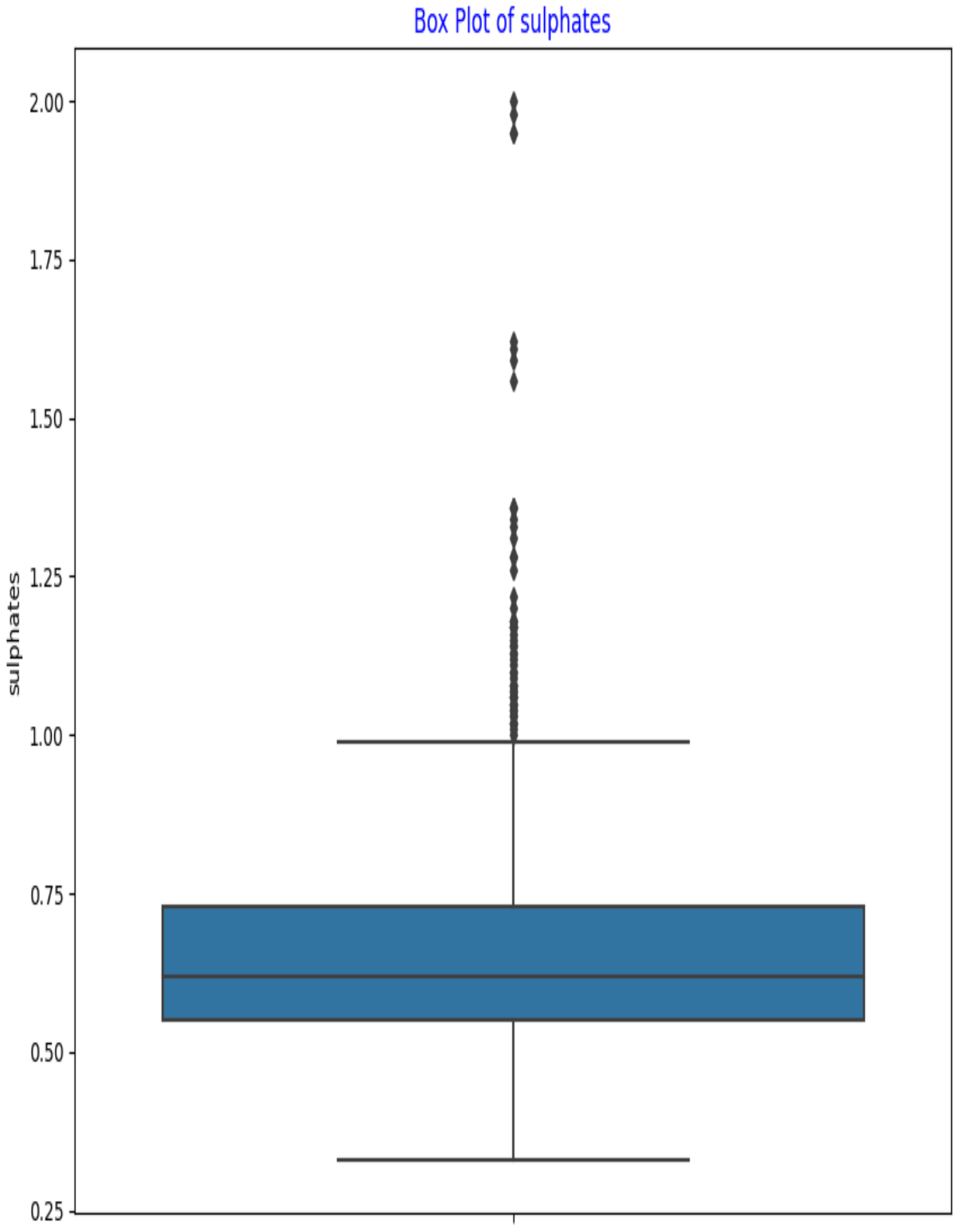

Distribution of density
Count
density
0
20
40
60
80
100
120
140
160
0.990
0.992
0.994
0.996
0.998
1.000
1.002
1.004

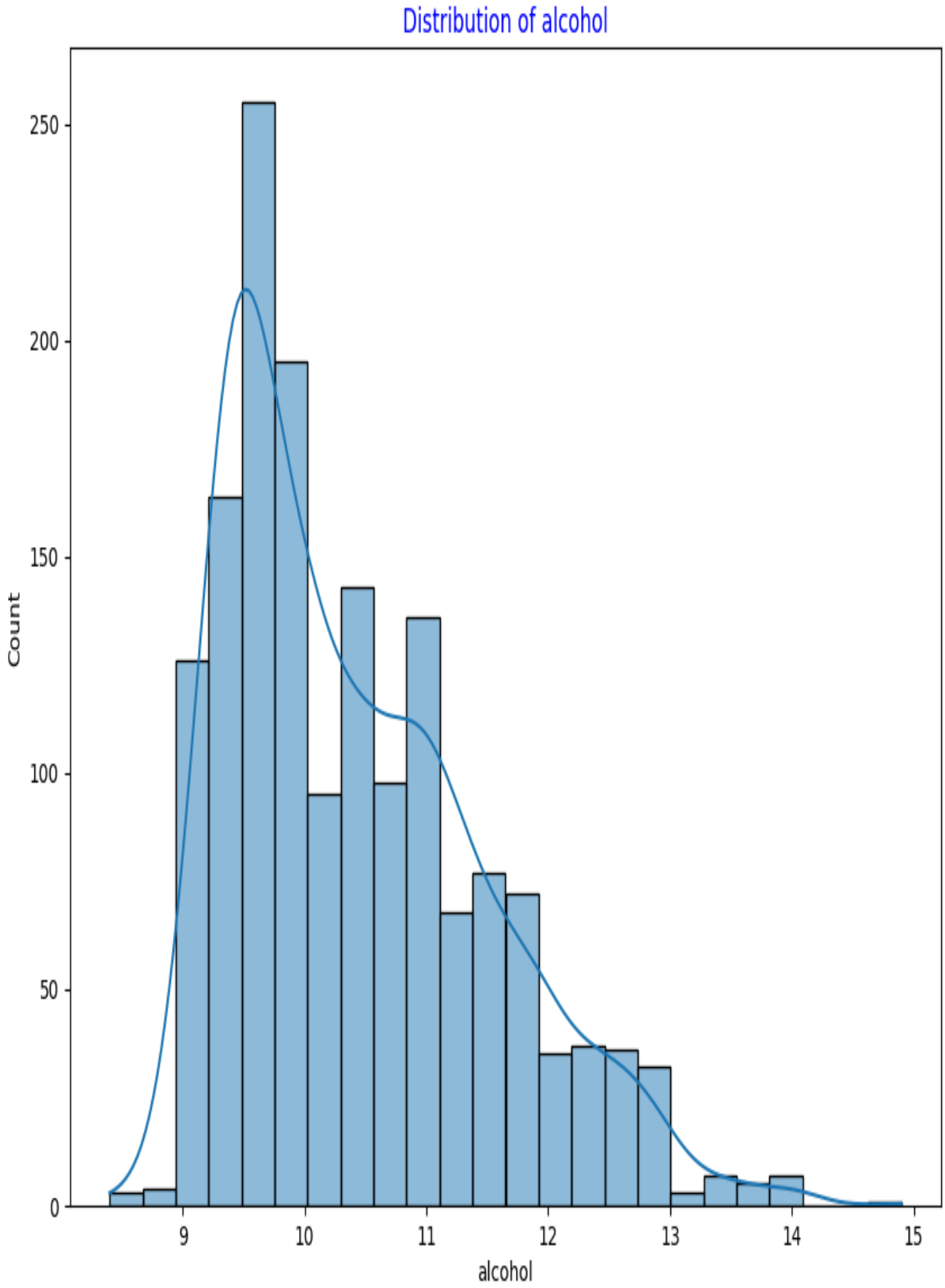

Box Plot of density
density
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990

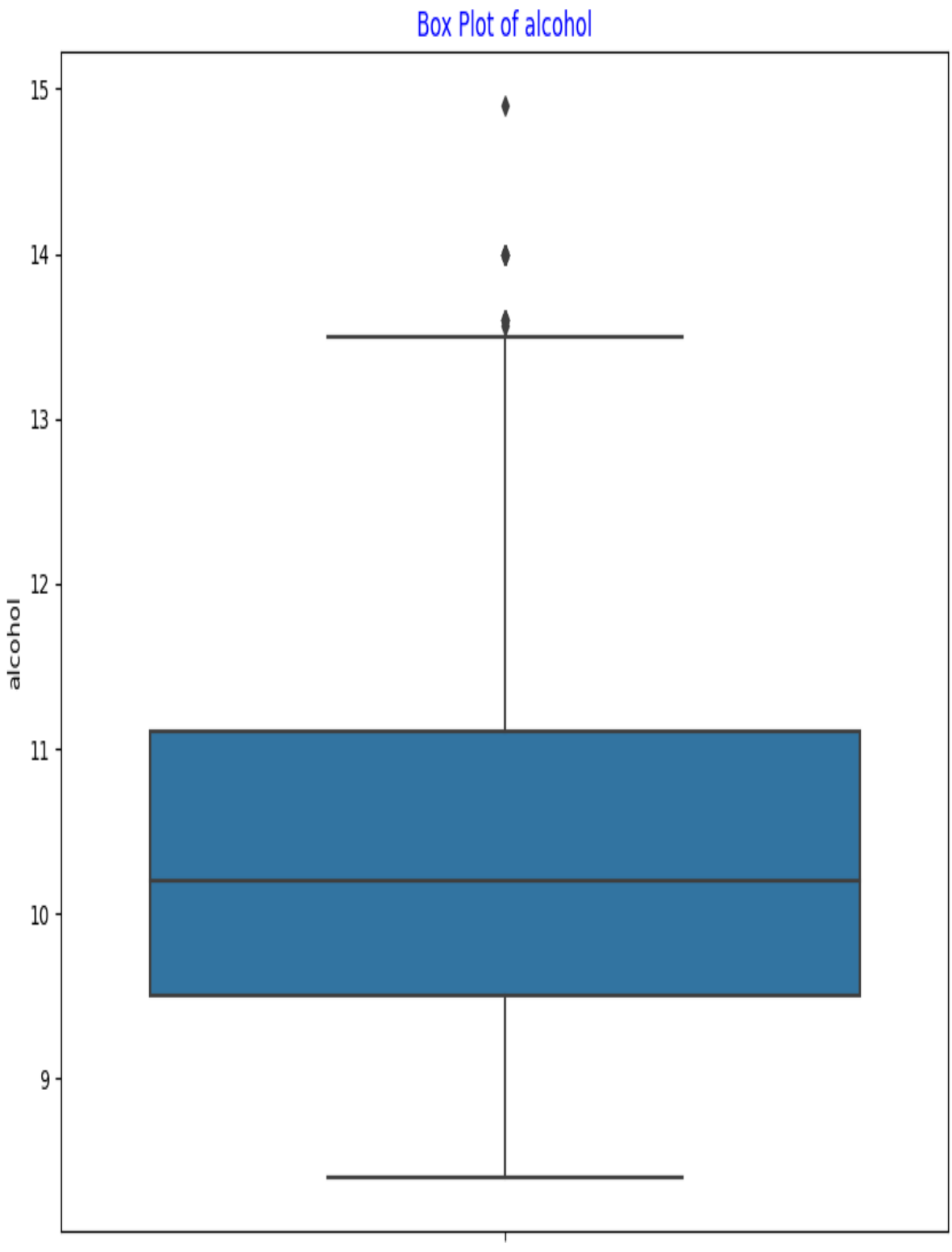

Distribution of pH
Count
pH
0
25
50
75
100
125
150
175
2.8
3.0
3.2
3.4
3.6
3.8
4.0

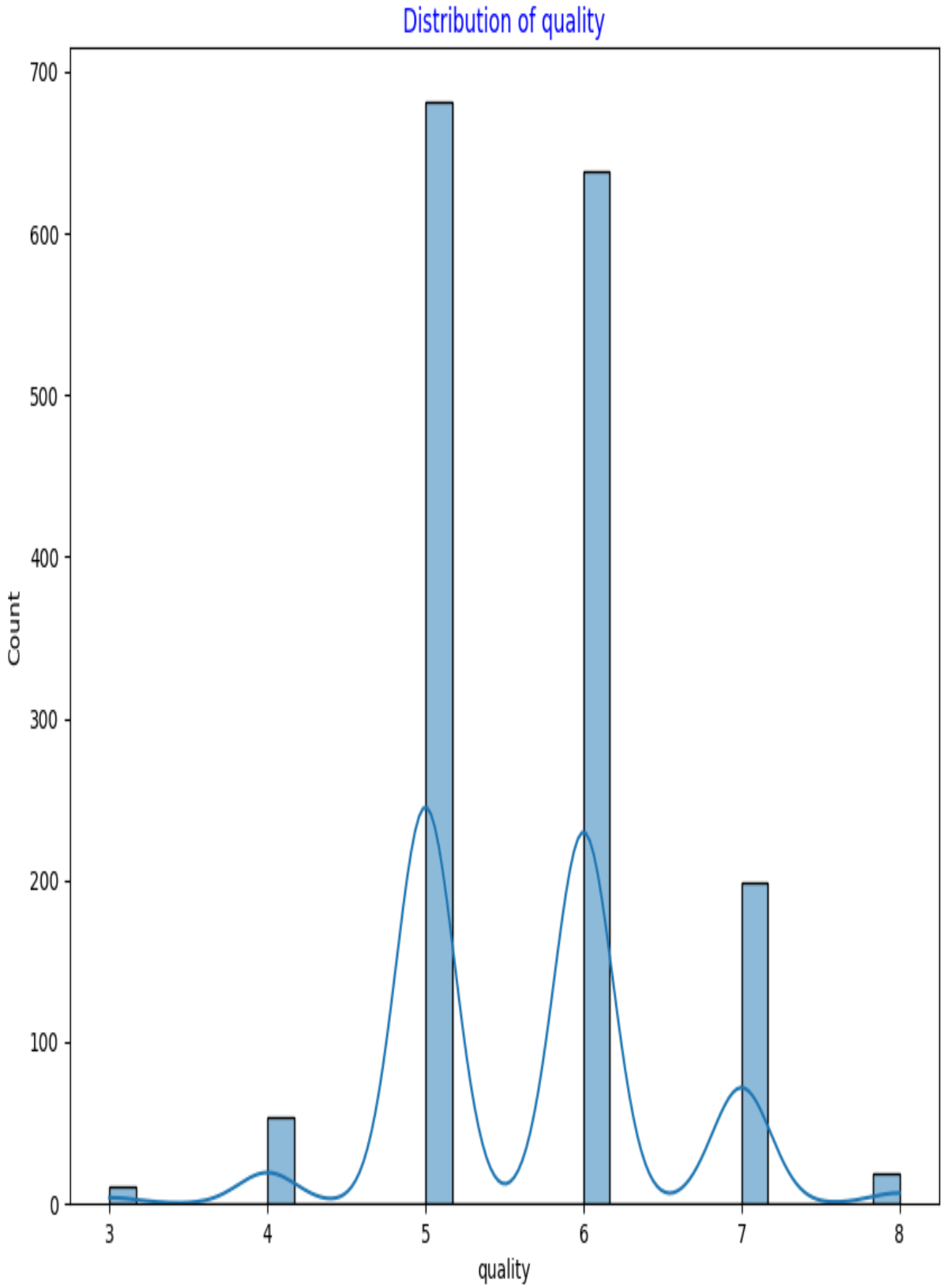

Box Plot of pH
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8

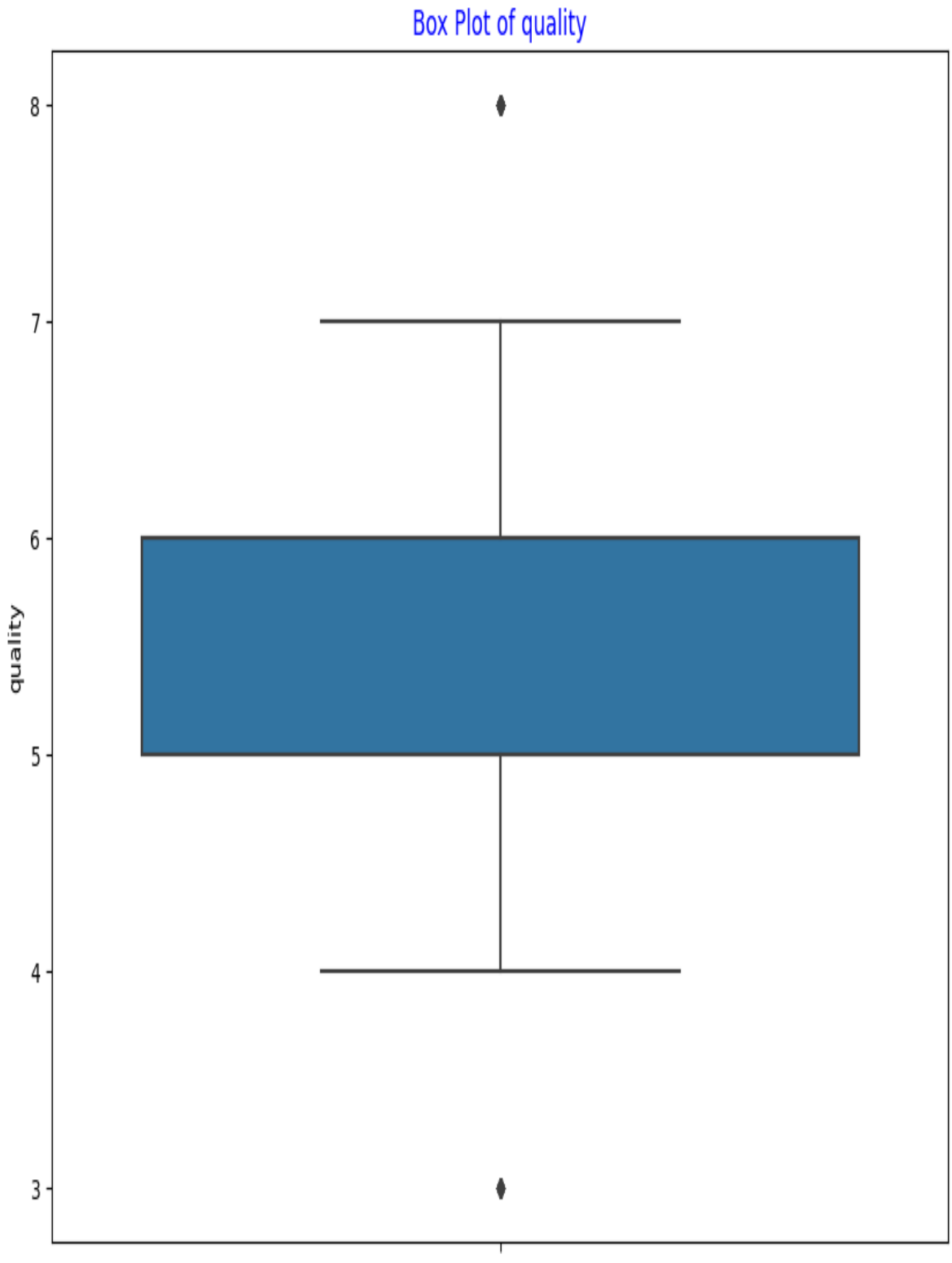

Distribution of sulphates
Count
sulphates
0
25
50
75
100
125
150
175
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00

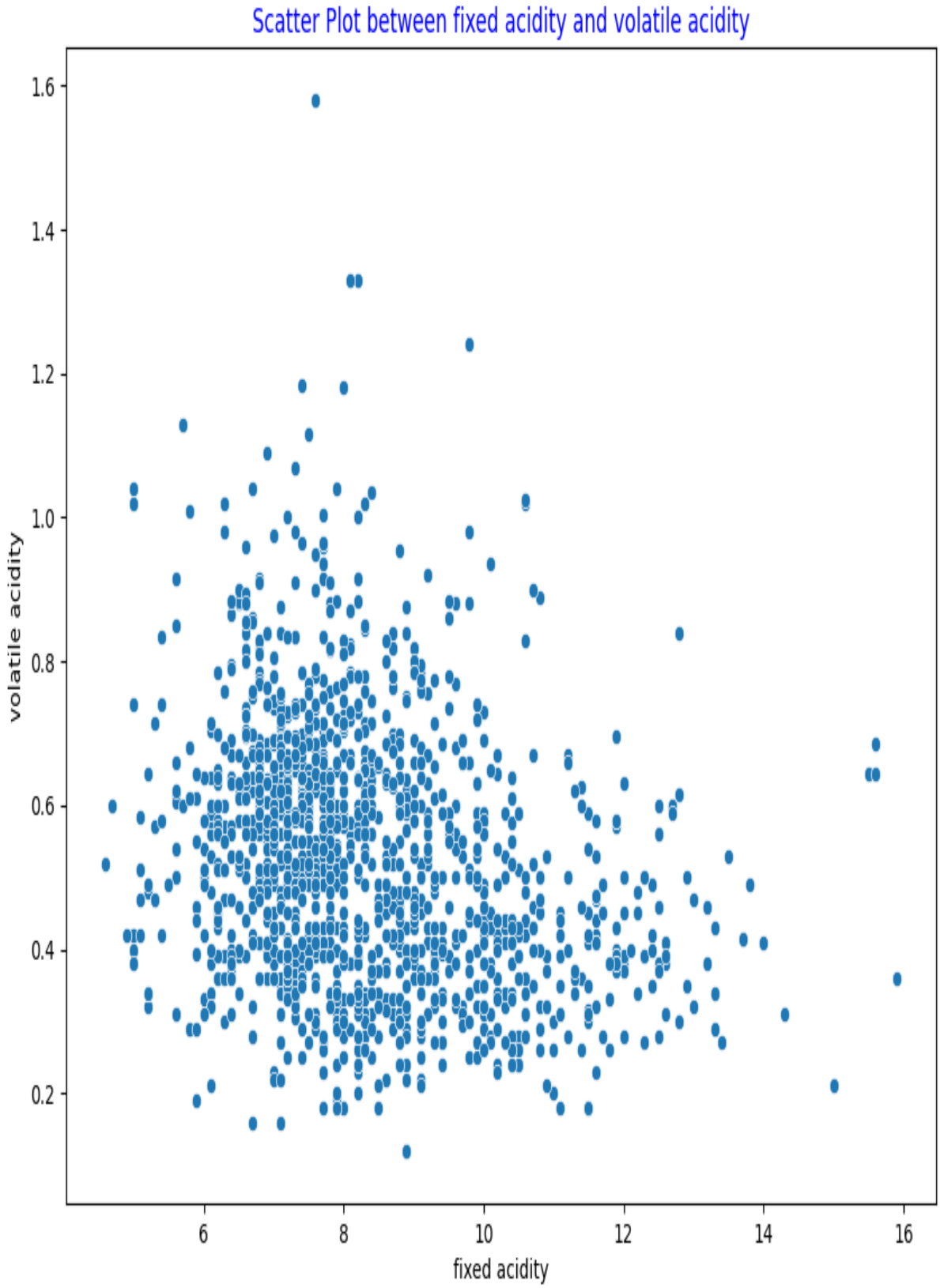

Box Plot of sulphates
sulphates
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25

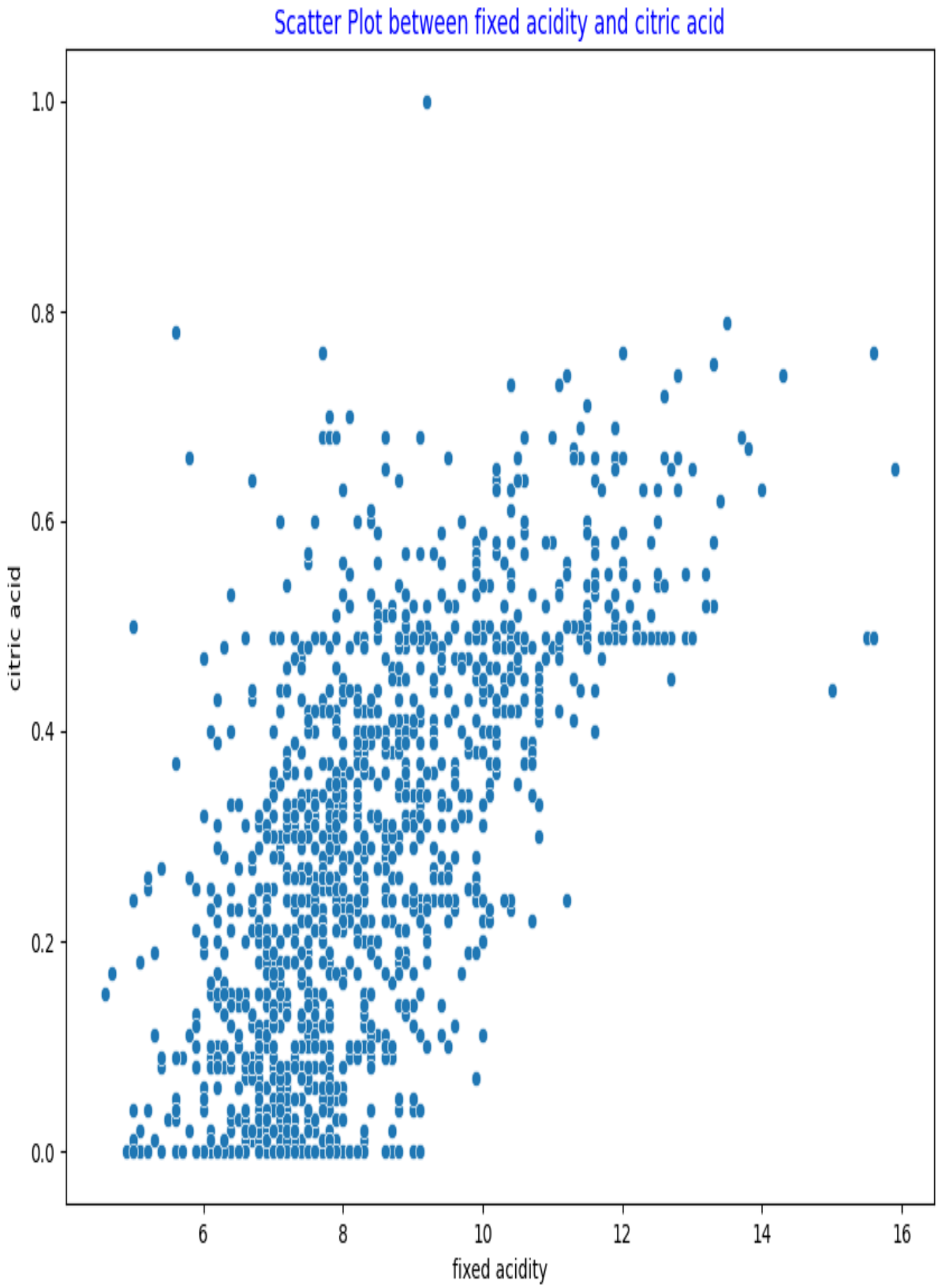

Distribution of alcohol
Count
alcohol
0
50
100
150
200
250
9
10
11
12
13
14
15

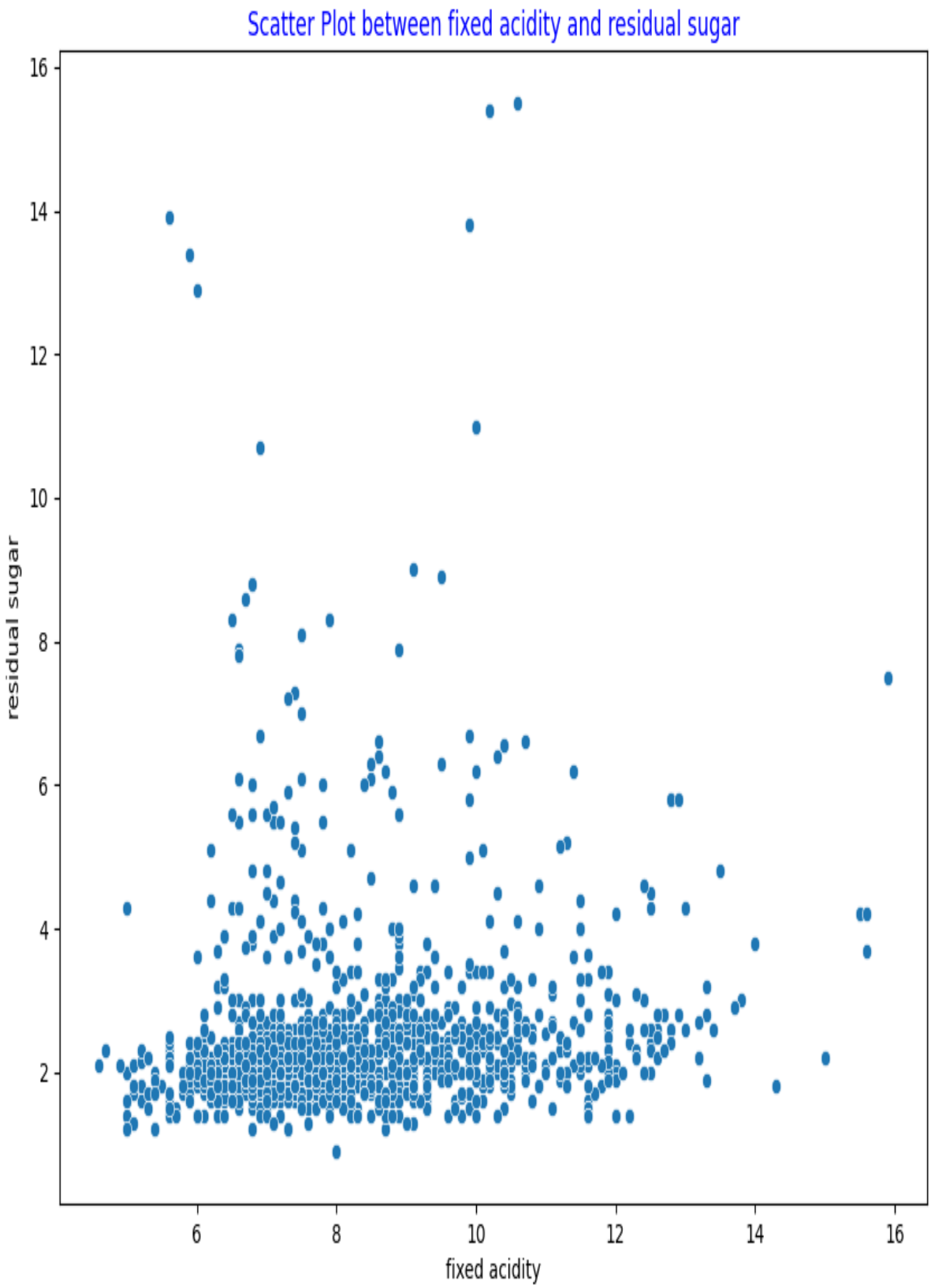

Box Plot of alcohol
alcohol
15
14
13
12
11
10
9

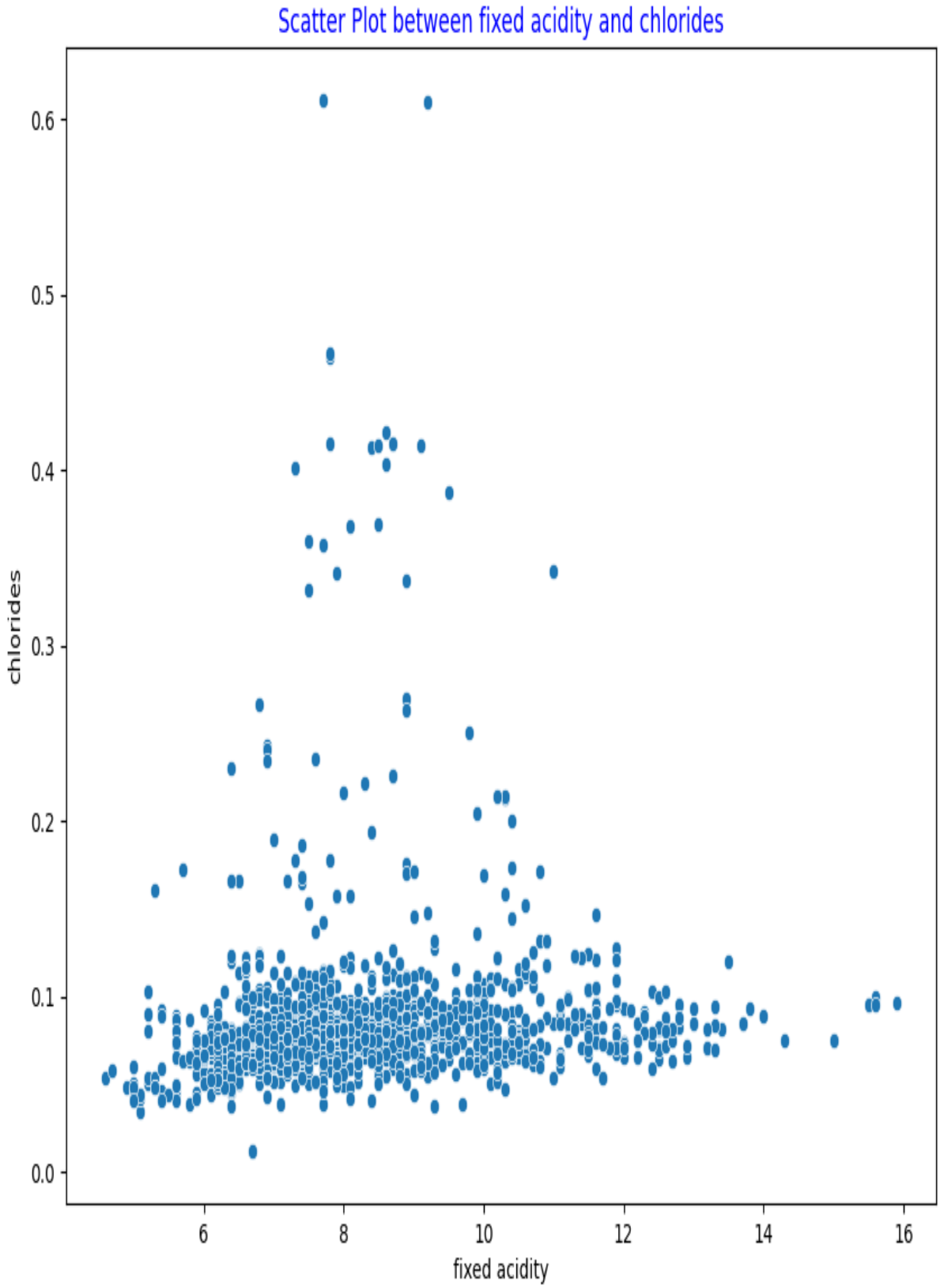

Distribution of quality
700
600
500
400
300
200
100
0
Count
3
4
5
6
7
8
quality

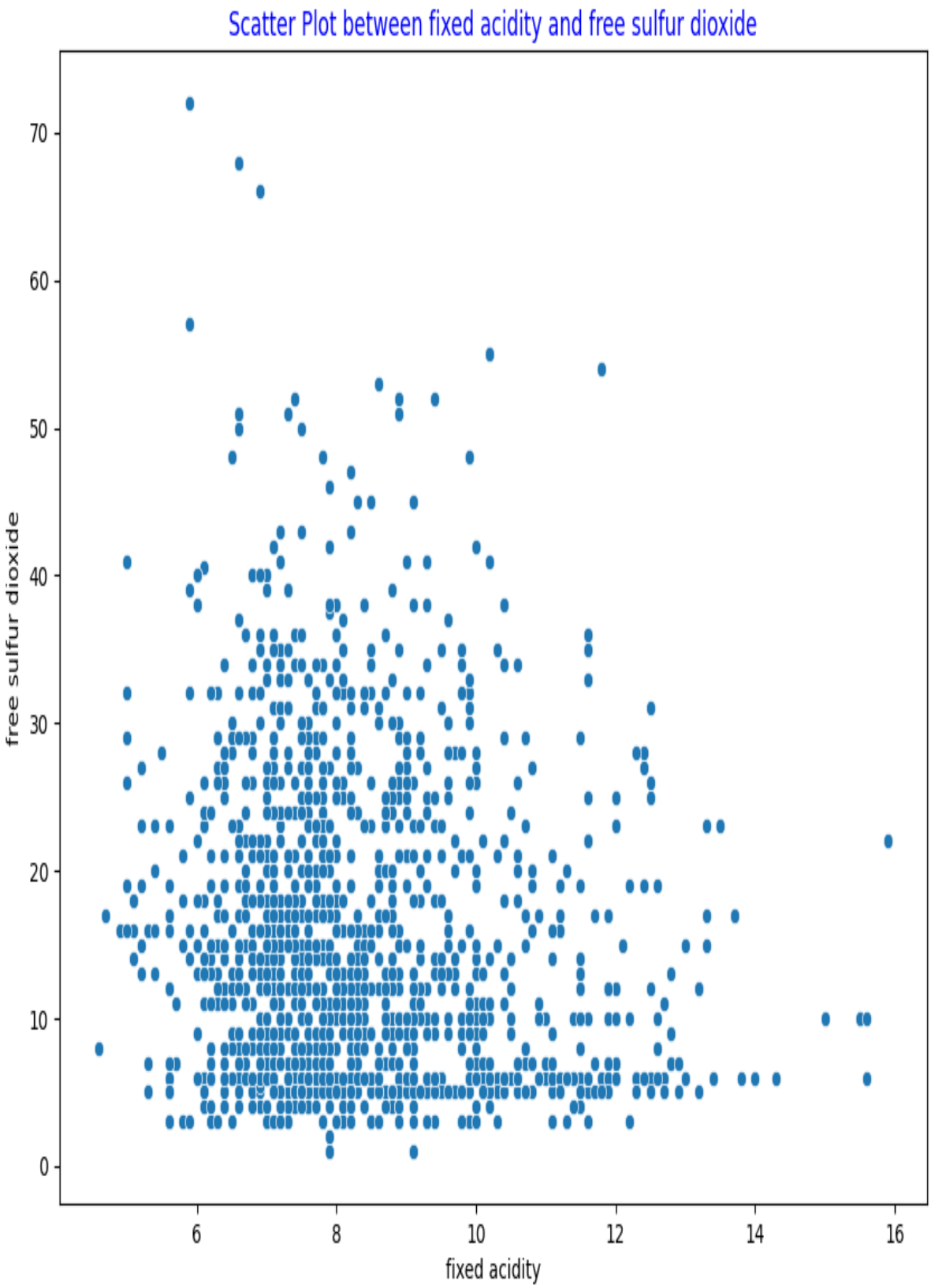

Box Plot of quality
quality
8
7
6
5
4
3

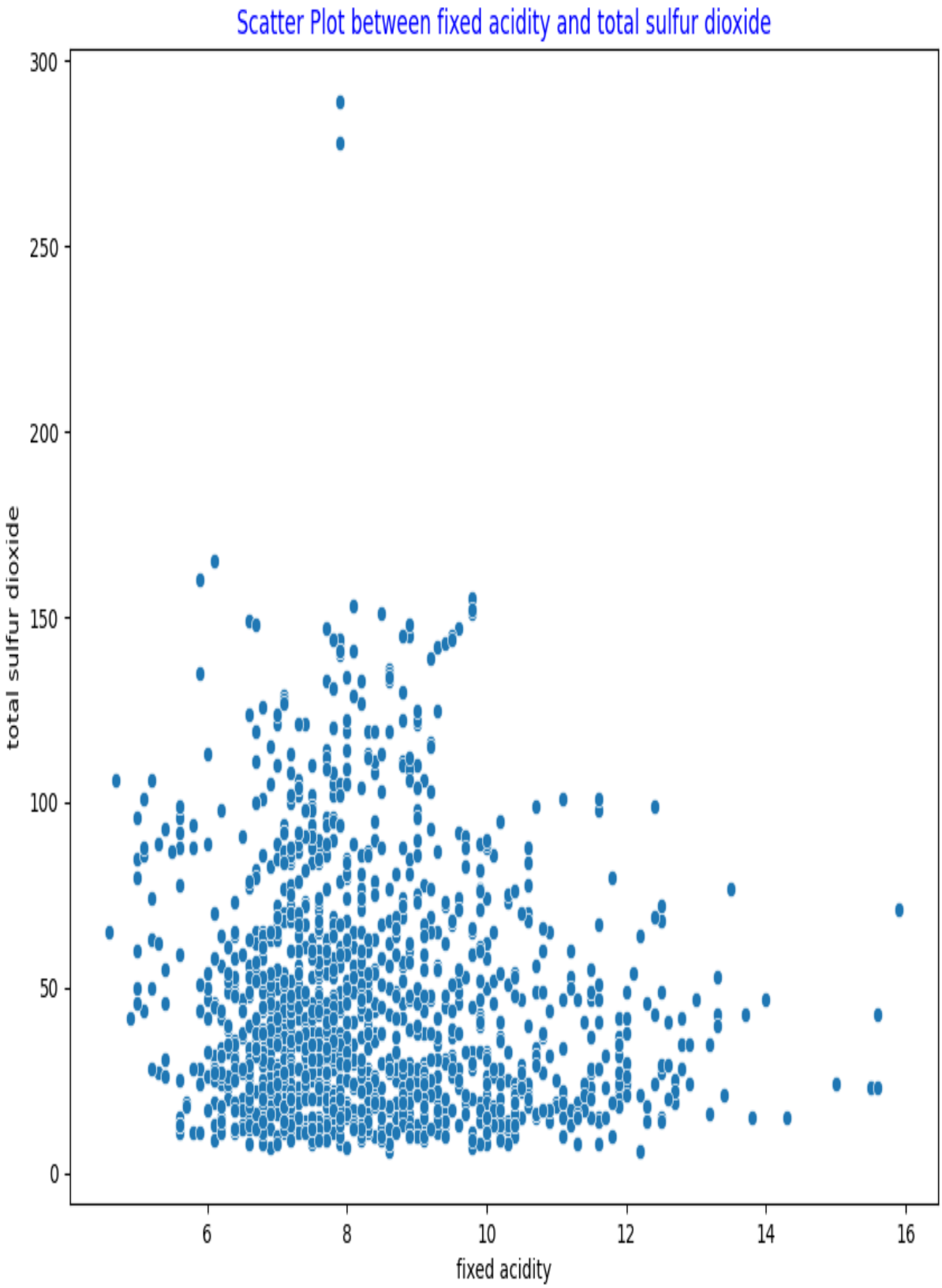

Scatter Plot between fixed acidity and volatile acidity
volatile acidity
fixed acidity
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
6
8
10
12
14
16

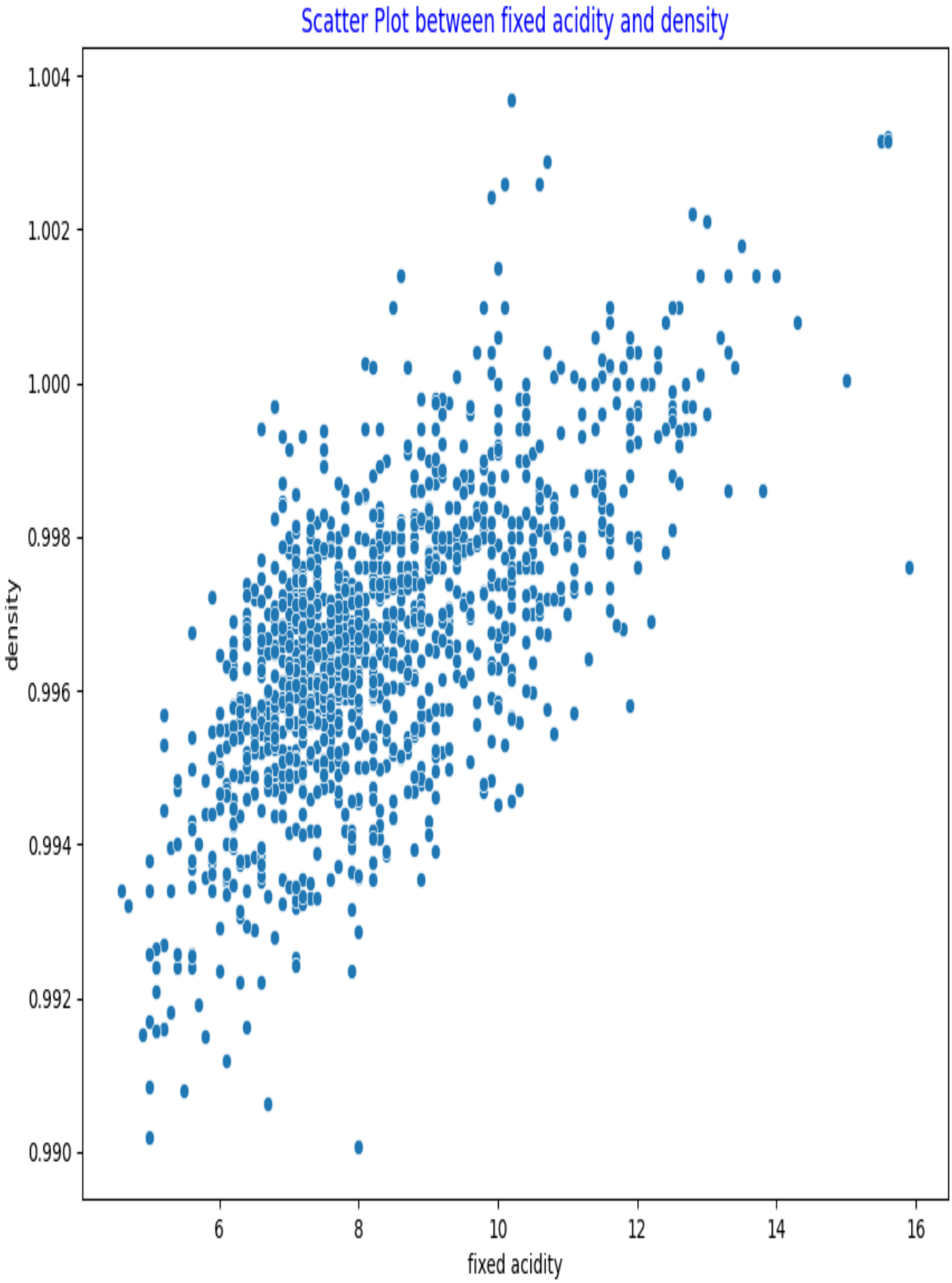

Scatter Plot between fixed acidity and citric acid
citric acid
fixed acidity
0.0
0.2
0.4
0.6
0.8
1.0
6
8
10
12
14
16

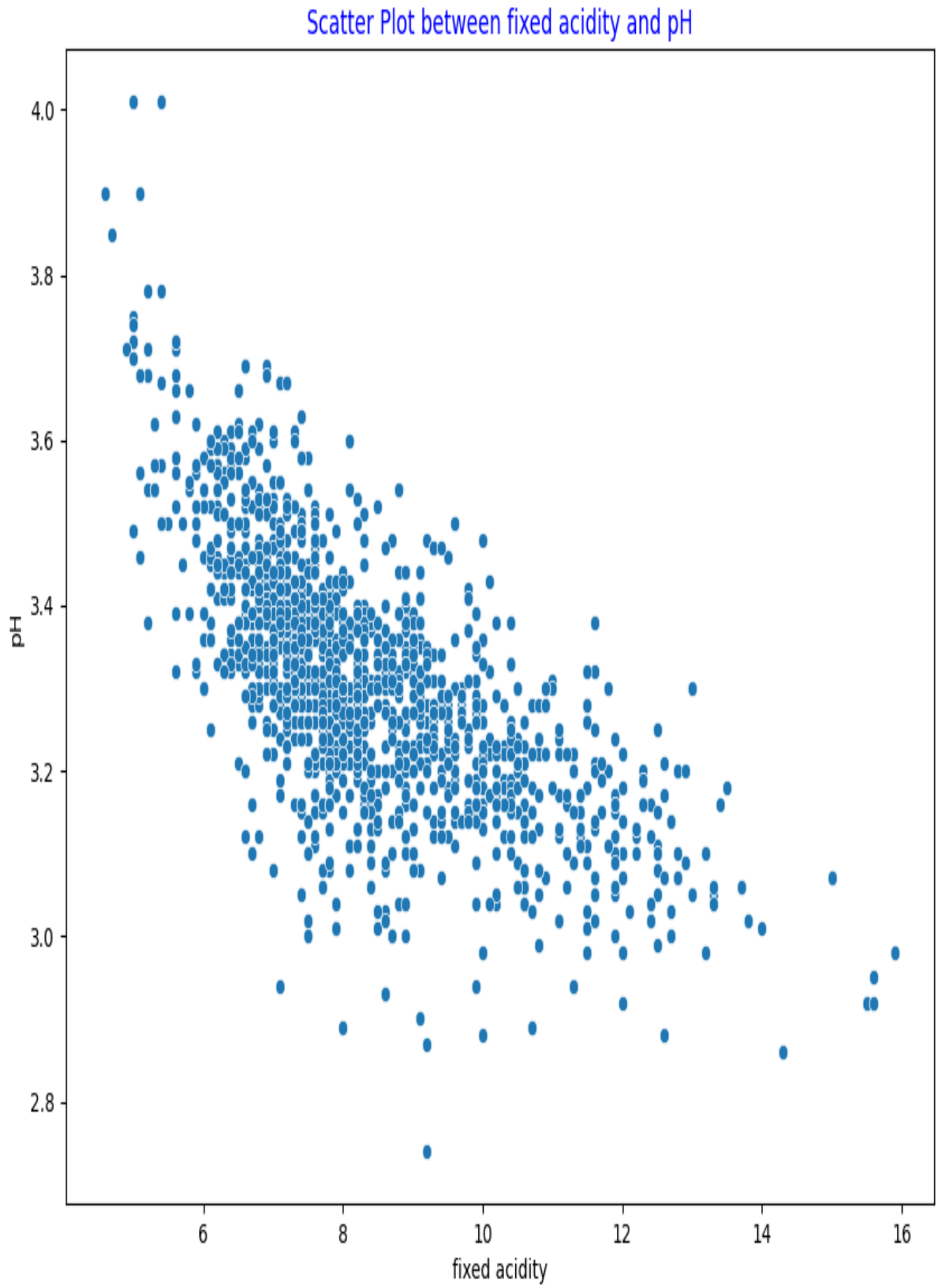

Scatter Plot between fixed acidity and residual sugar
residual sugar
fixed acidity
16
14
12
10
8
6
4
2
6
8
10
12
14
16

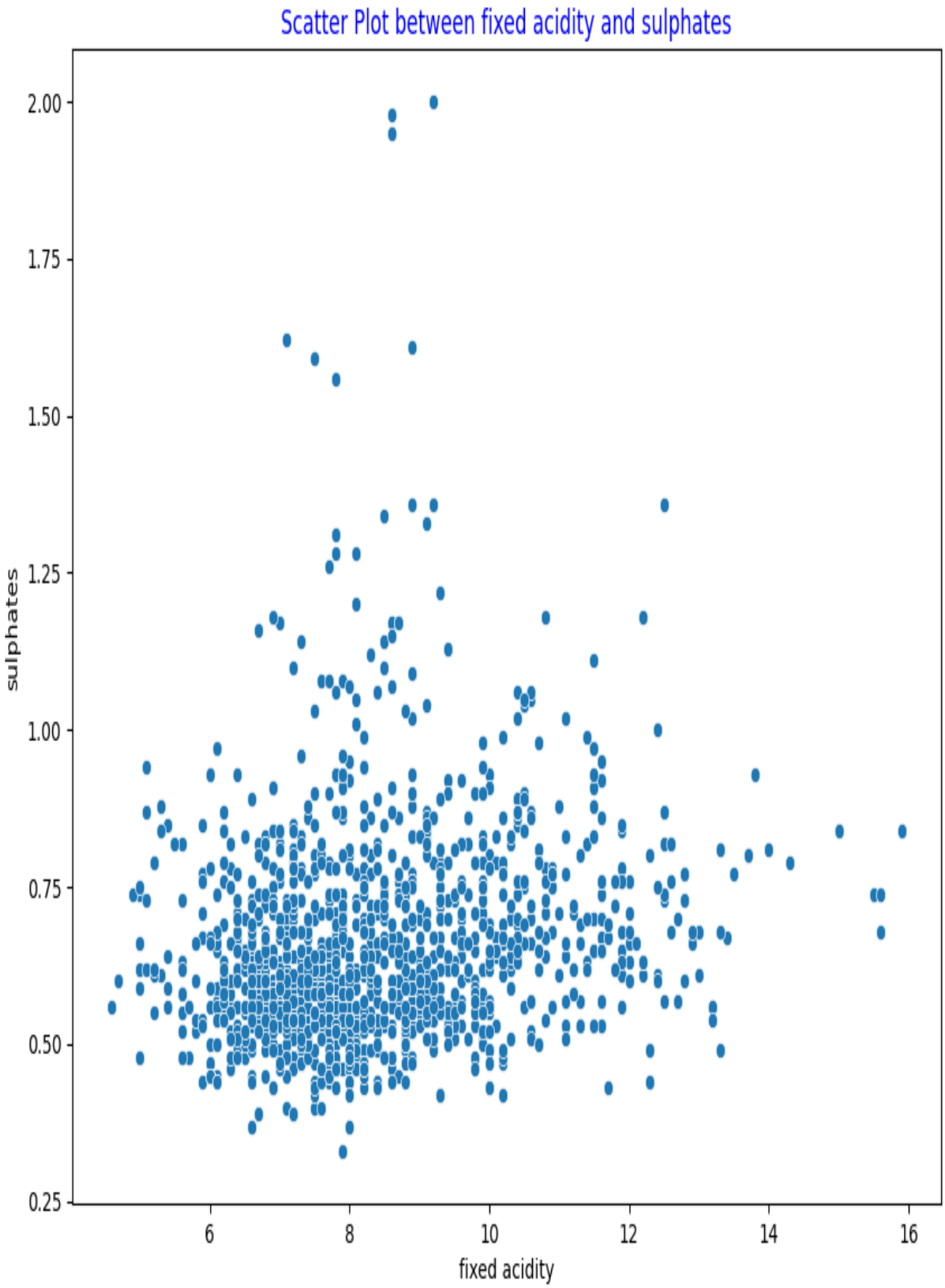

Scatter Plot between fixed acidity and chlorides
chlorides
fixed acidity
0.0
0.1
0.2
0.3
0.4
0.5
0.6
6
8
10
12
14
16

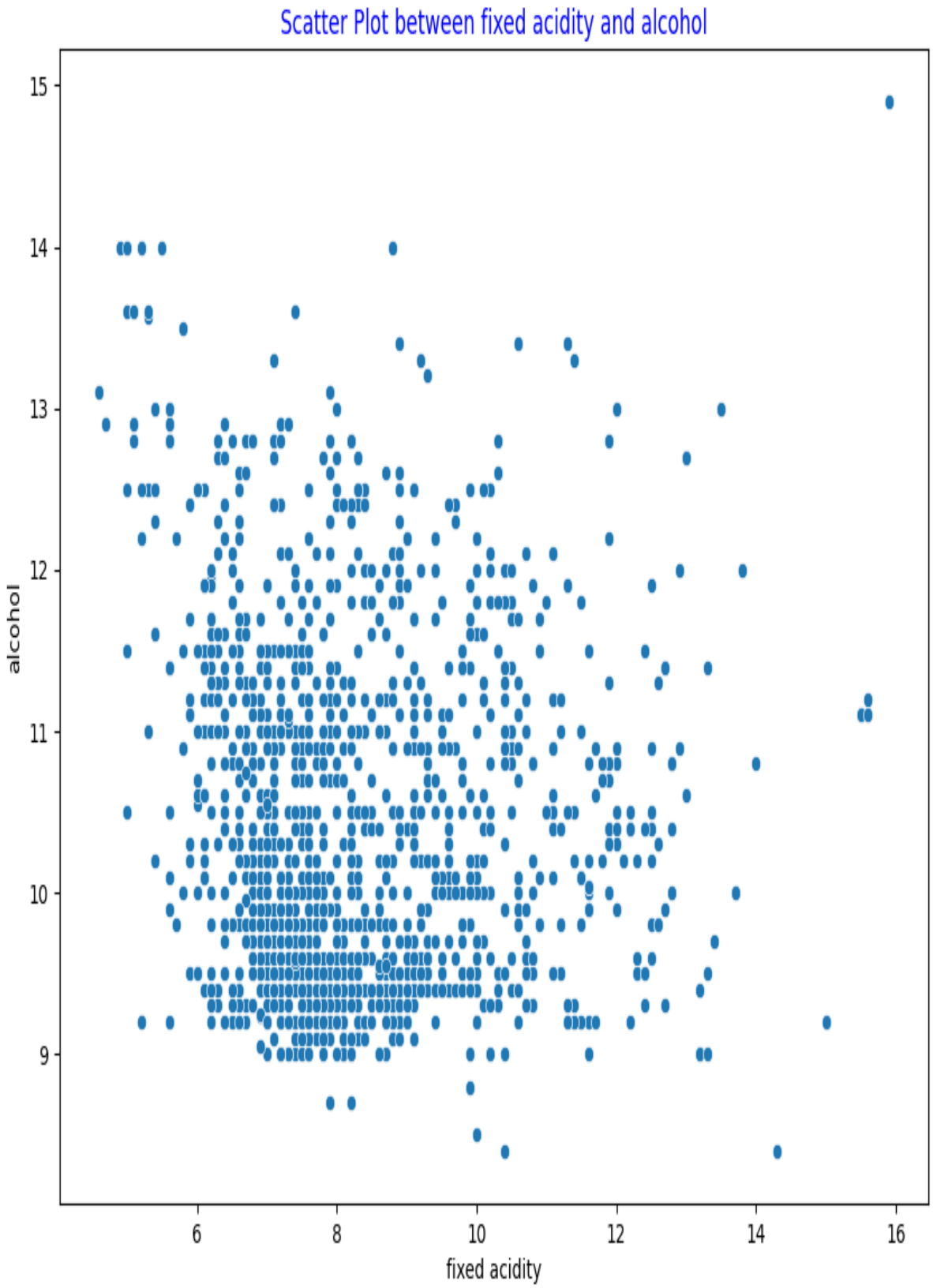

Scatter Plot between fixed acidity and free sulfur dioxide
free sulfur dioxide
fixed acidity
0
10
20
30
40
50
60
70
6
8
10
12
14
16

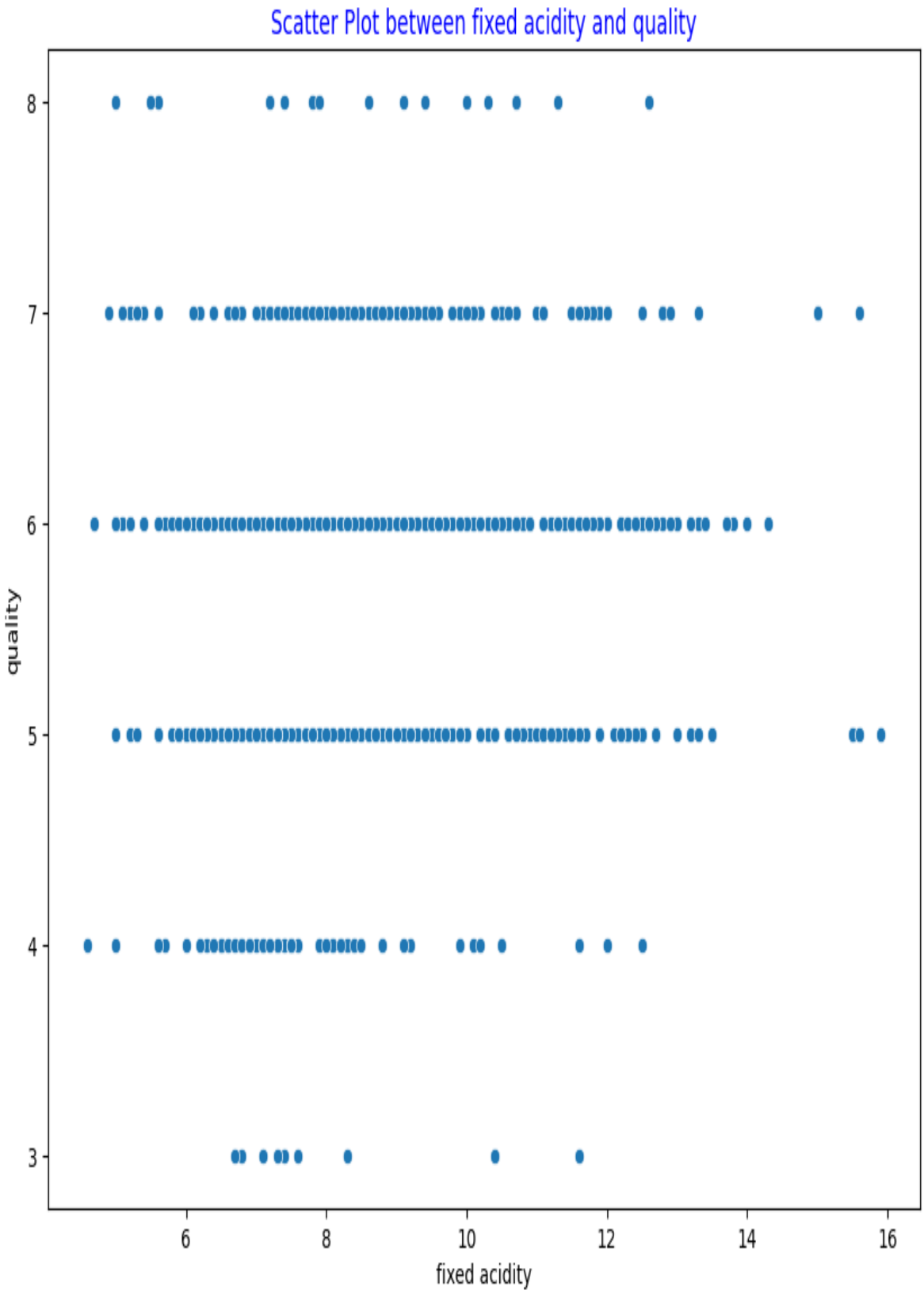

Scatter Plot between fixed acidity and total sulfur dioxide
total sulfur dioxide
fixed acidity
300
250
200
150
100
50
0
6
8
10
12
14
16

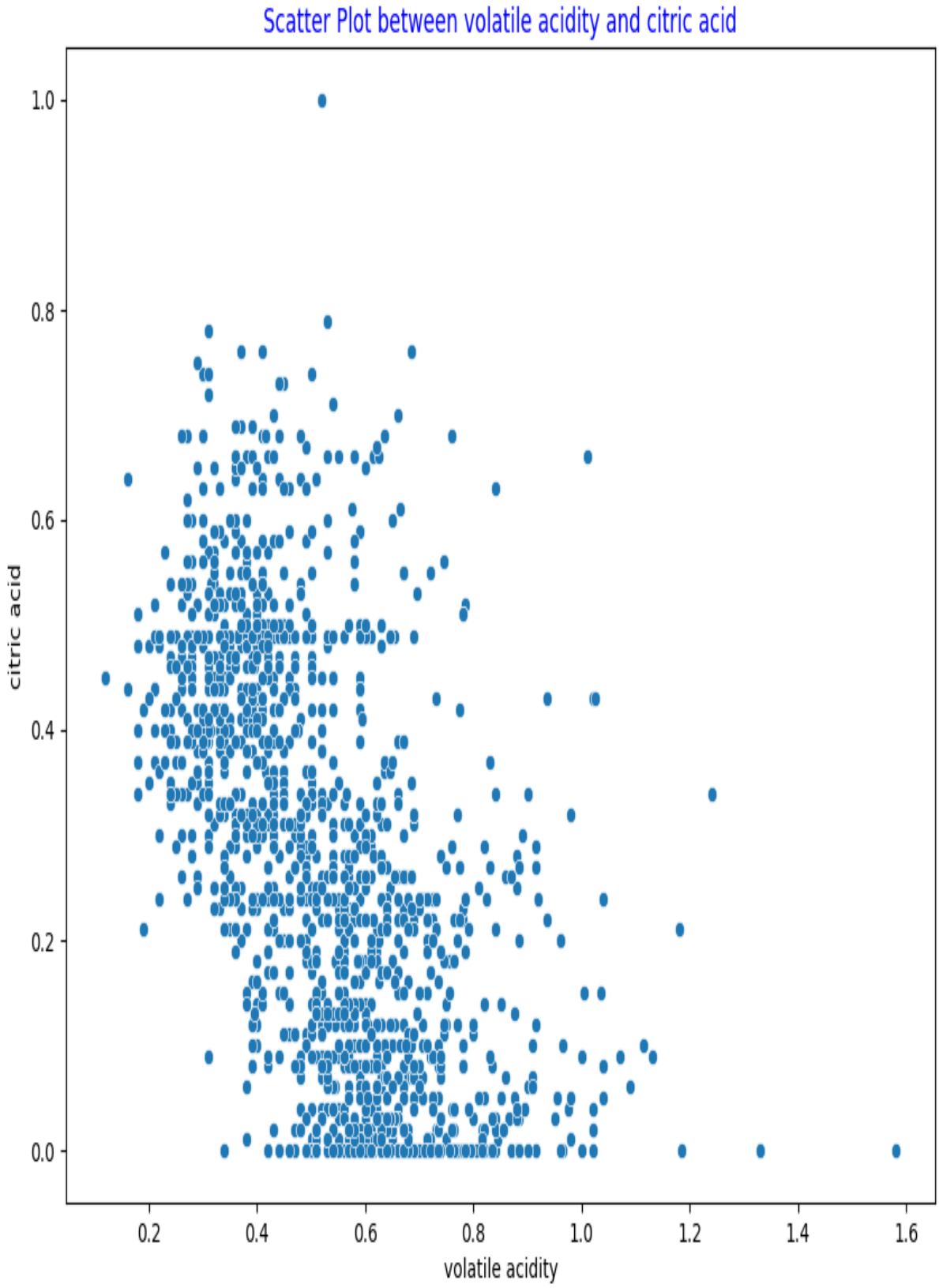

Scatter Plot between fixed acidity and density
density
fixed acidity
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
6
8
10
12
14
16

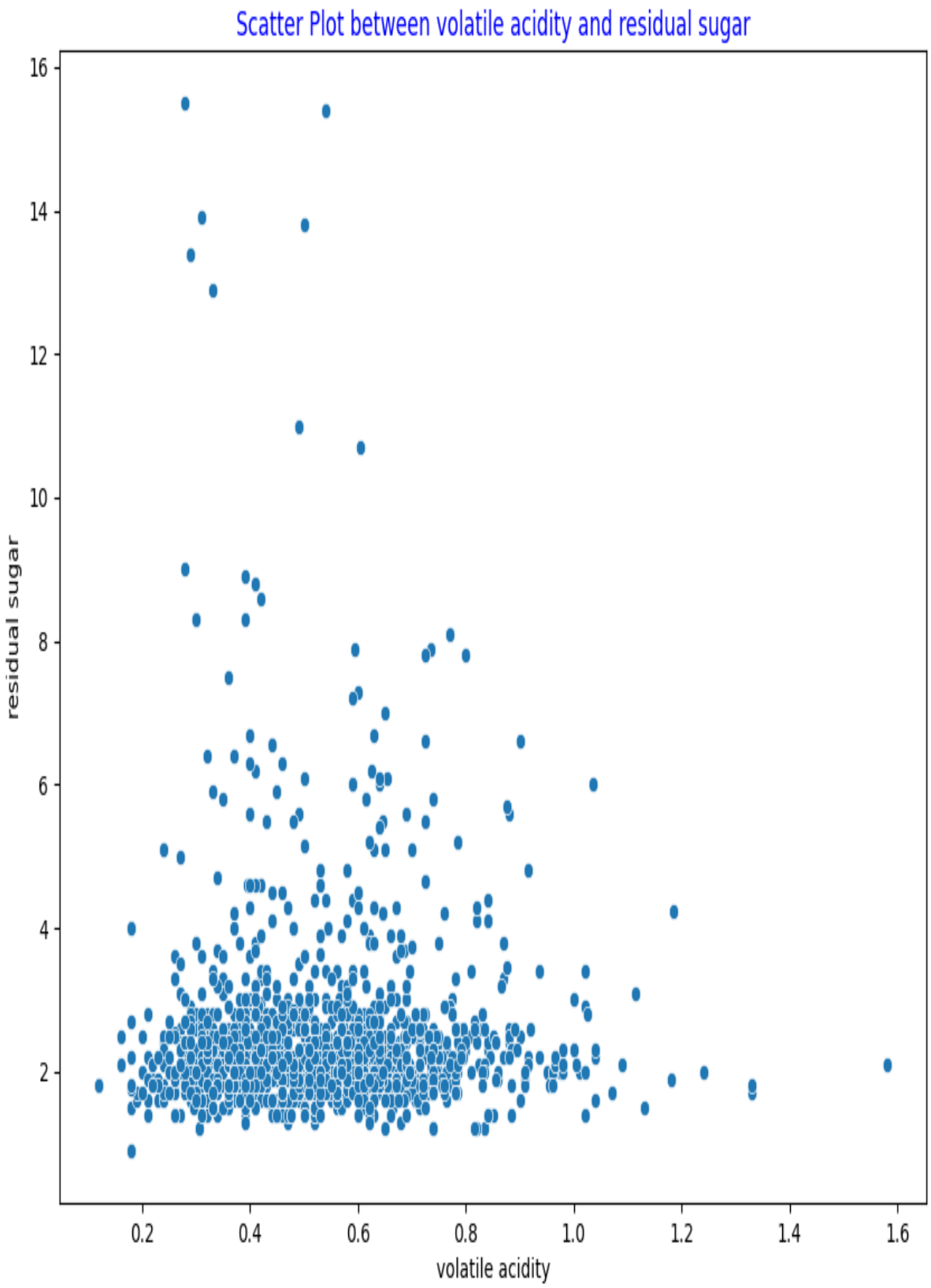

Scatter Plot between fixed acidity and pH
pH
fixed acidity
4.0
3.8
3.6
3.4
3.2
3.0
2.8
6
8
10
12
14
16

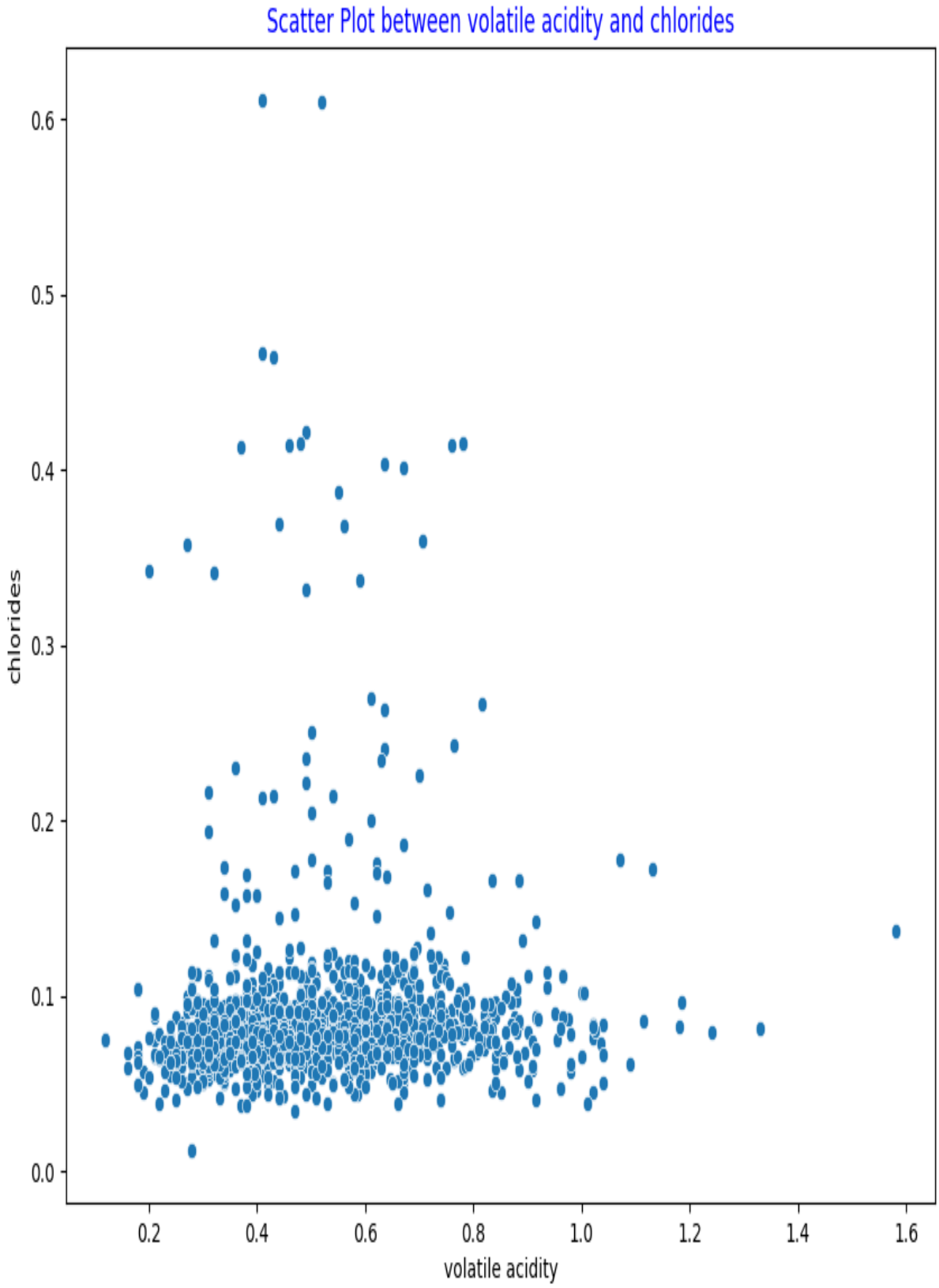

Scatter Plot between fixed acidity and sulphates
sulphates
fixed acidity
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
6
8
10
12
14
16

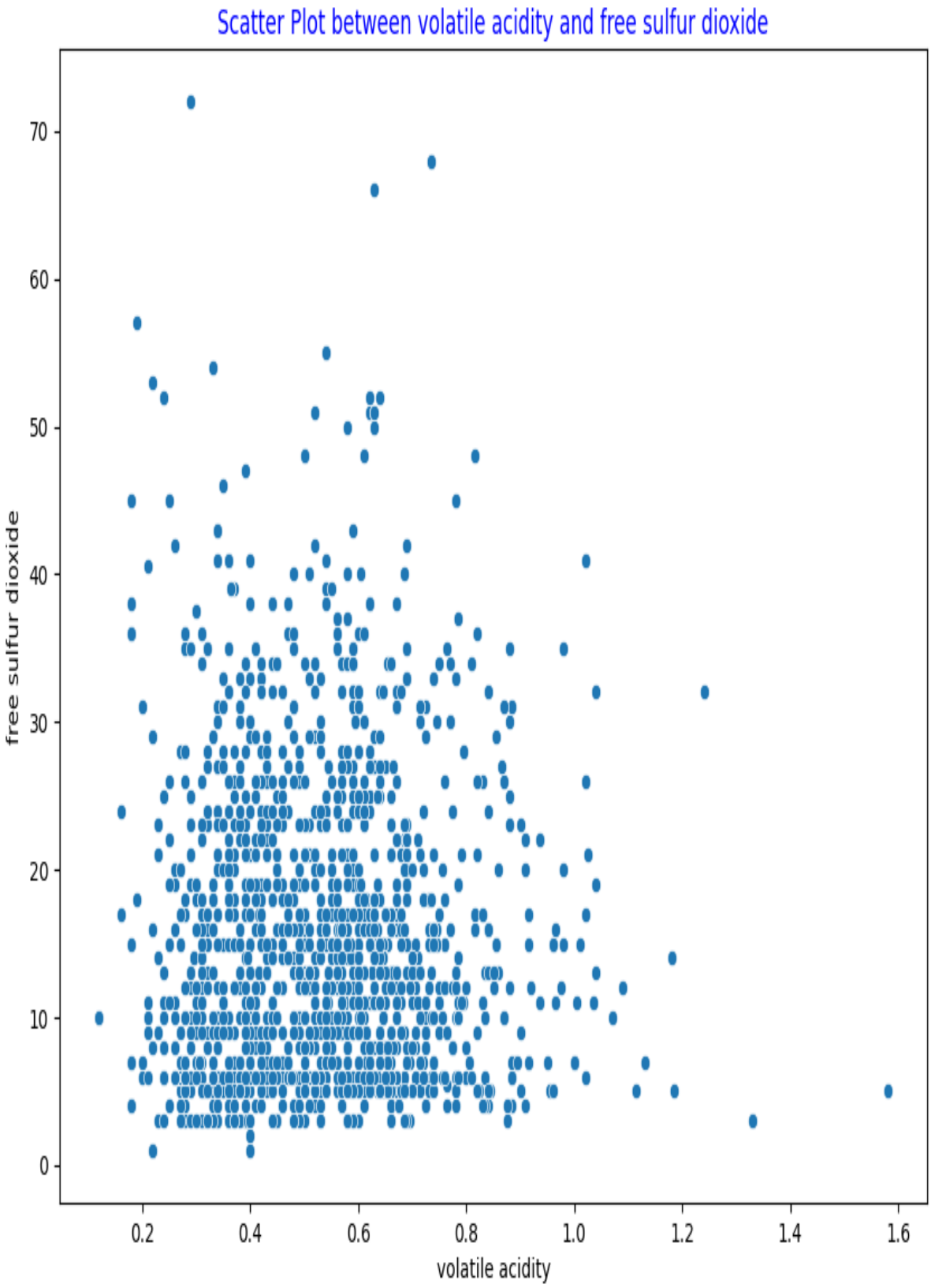

Scatter Plot between fixed acidity and alcohol
alcohol
fixed acidity
15
14
13
12
11
10
9
6
8
10
12
14
16

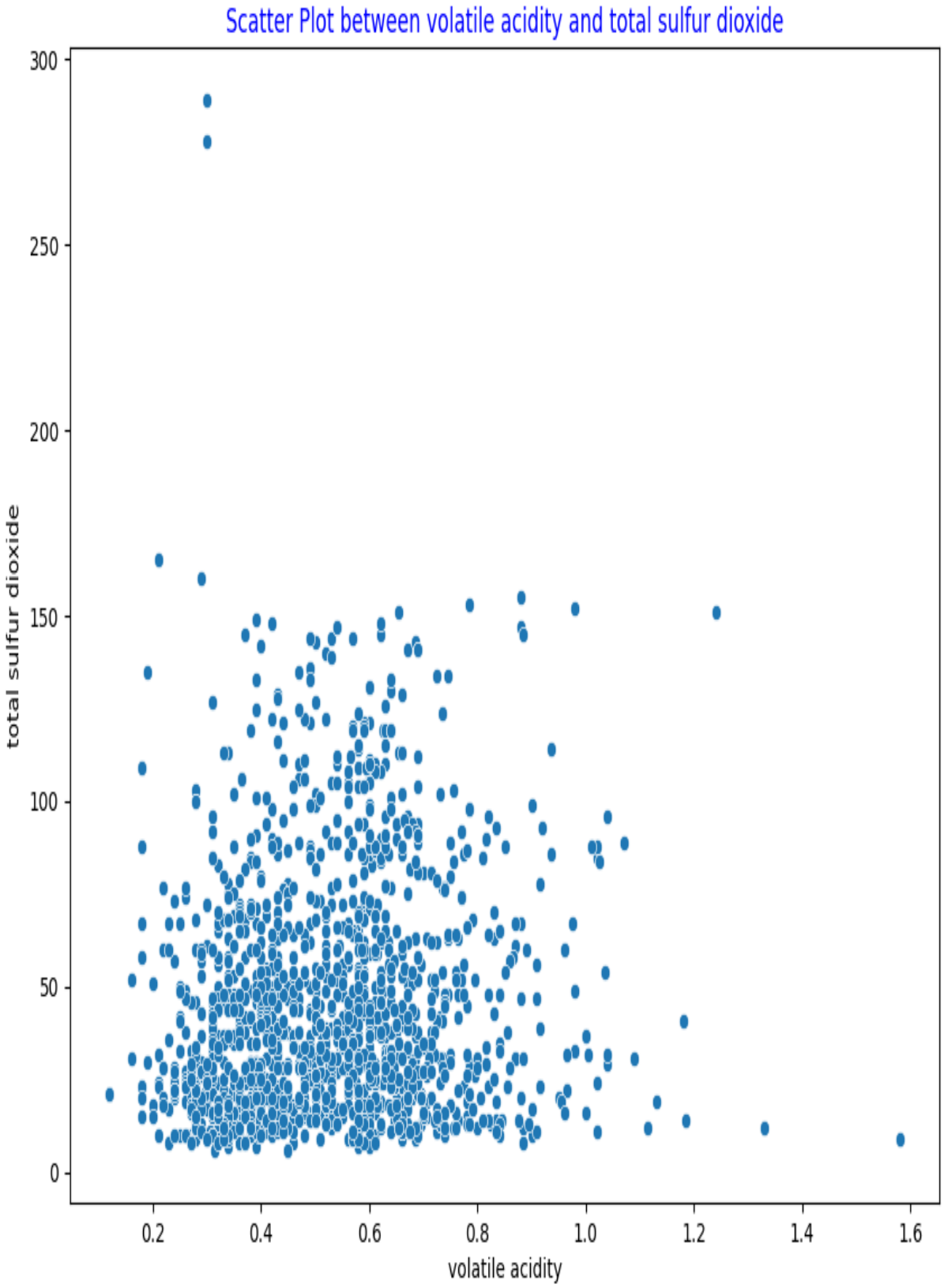

Scatter Plot between fixed acidity and quality
quality
fixed acidity
8
7
6
5
4
3
6
8
10
12
14
16

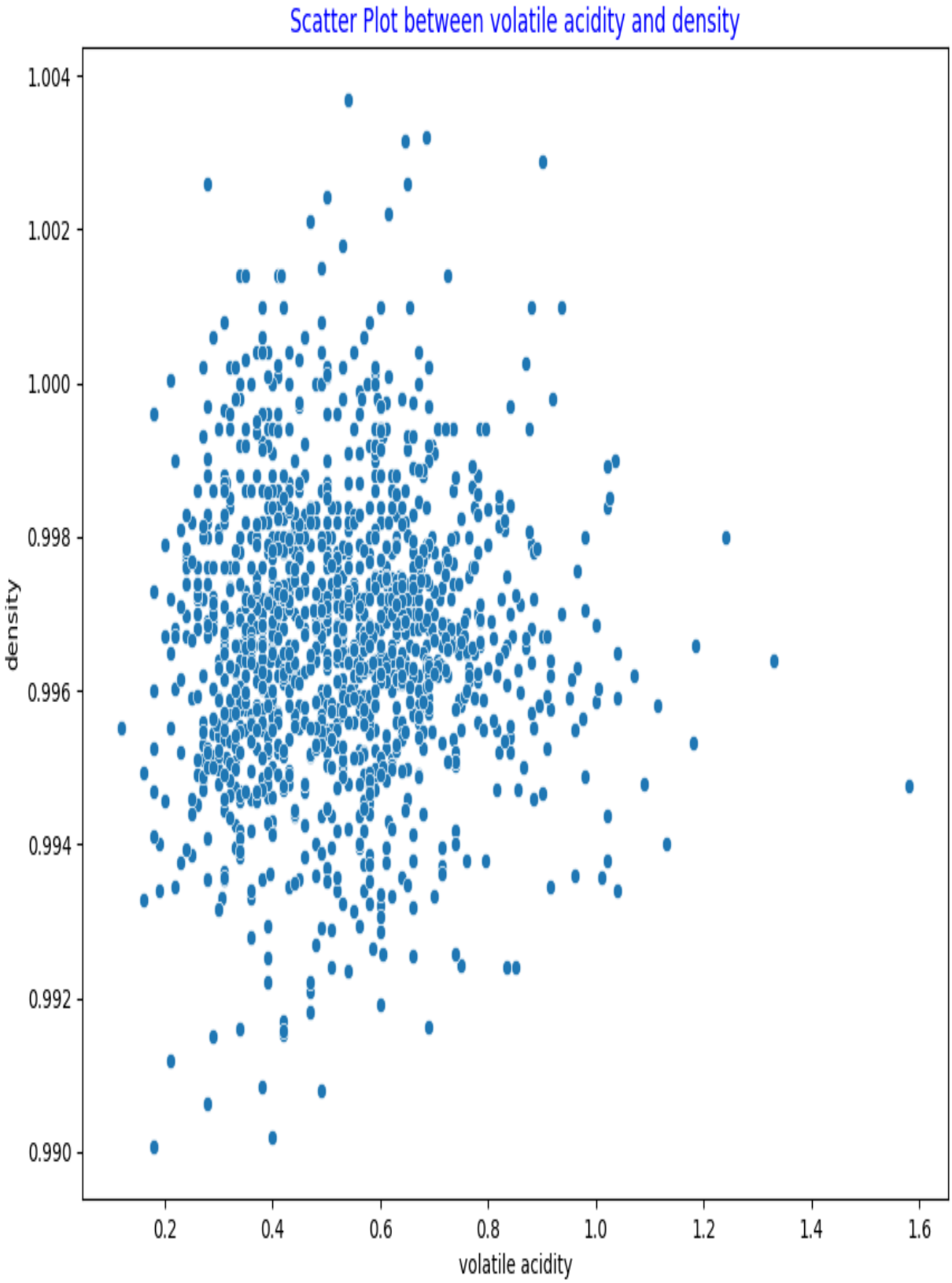

Scatter Plot between volatile acidity and citric acid
citric acid
volatile acidity
1.0
0.8
0.6
0.4
0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

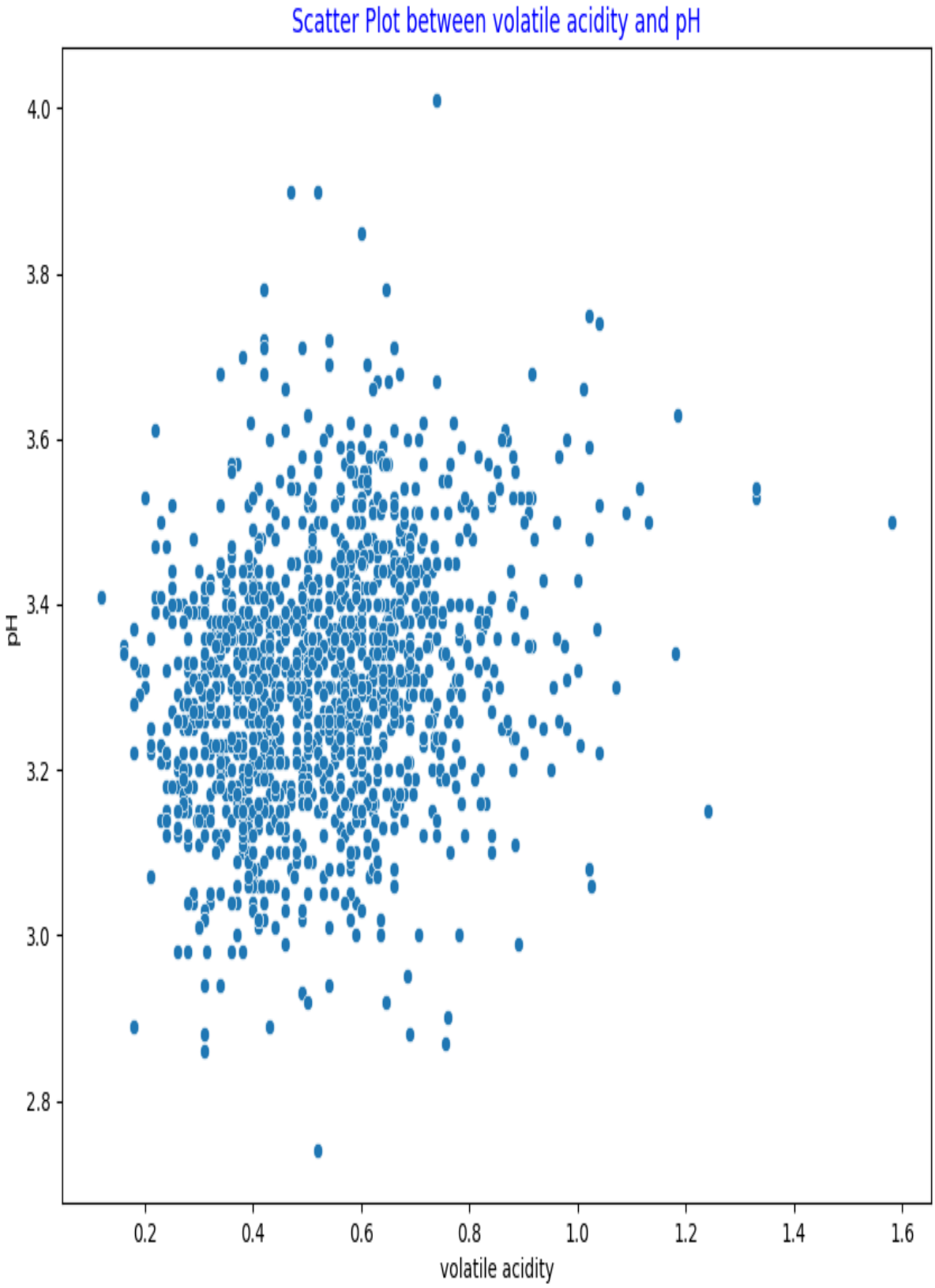

Scatter Plot between volatile acidity and residual sugar
residual sugar
volatile acidity
16
14
12
10
8
6
4
2
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

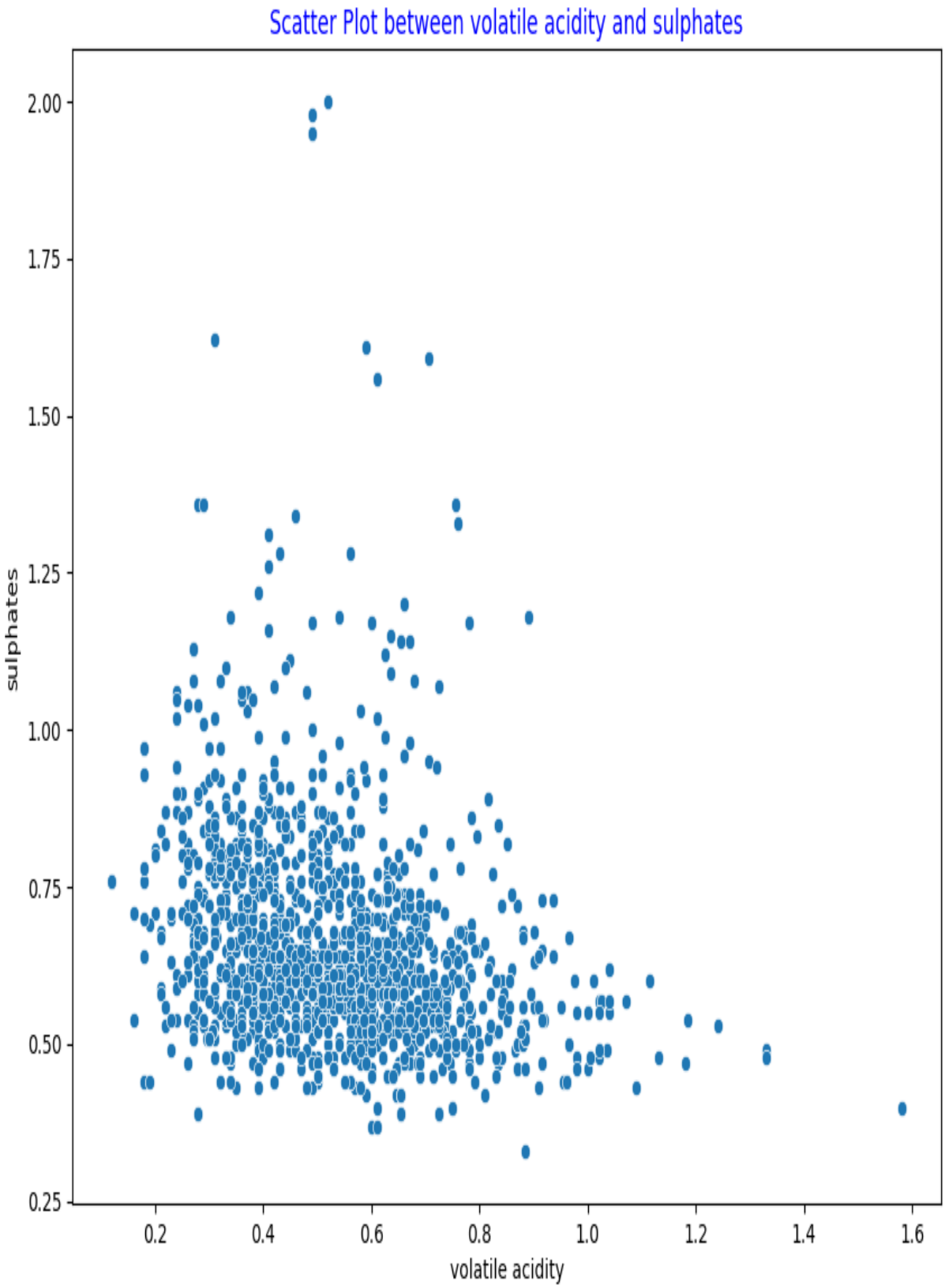

Scatter Plot between volatile acidity and chlorides
chlorides
volatile acidity
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

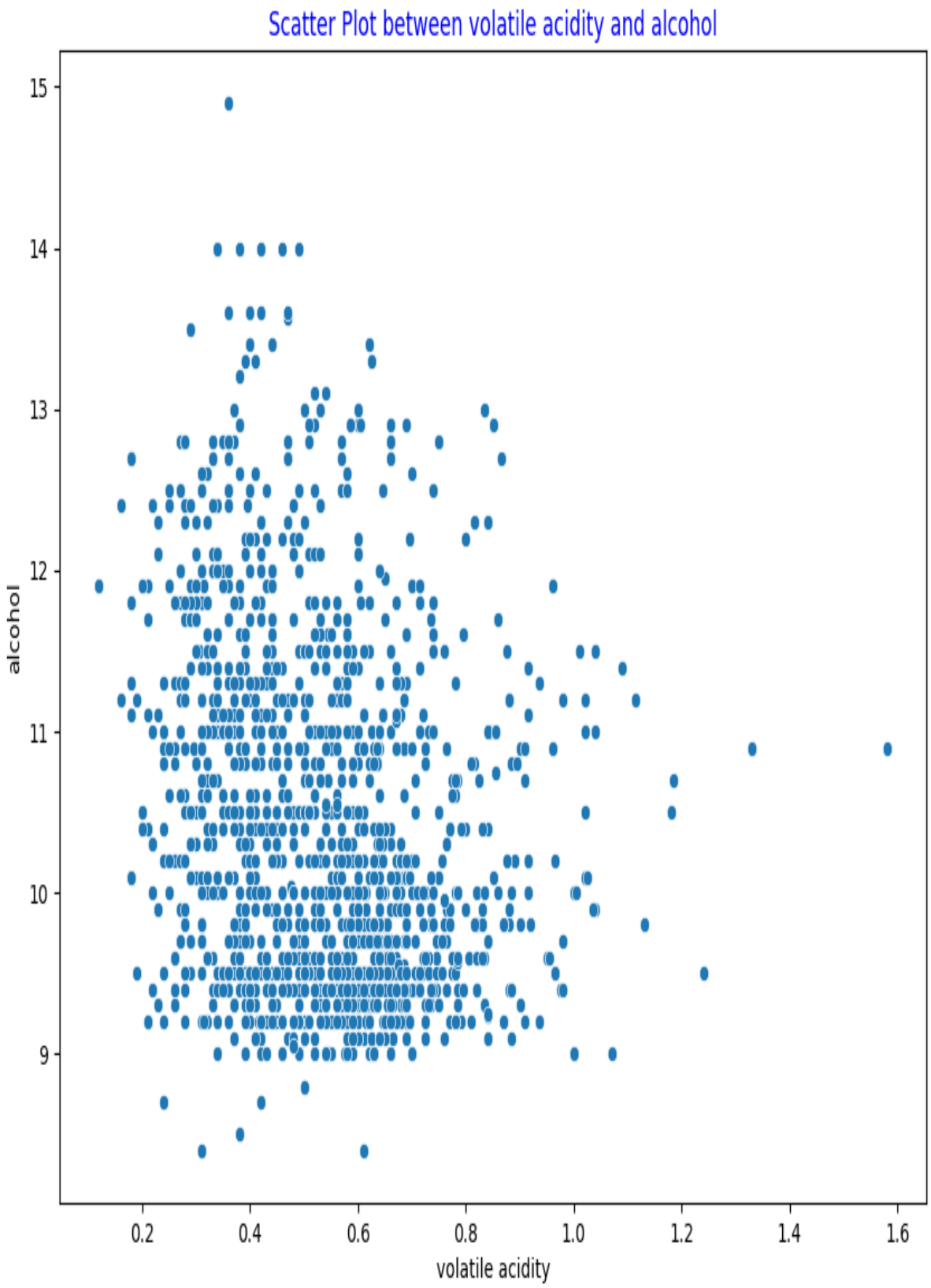

Scatter Plot between volatile acidity and free sulfur dioxide
free sulfur dioxide
volatile acidity
0
10
20
30
40
50
60
70
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

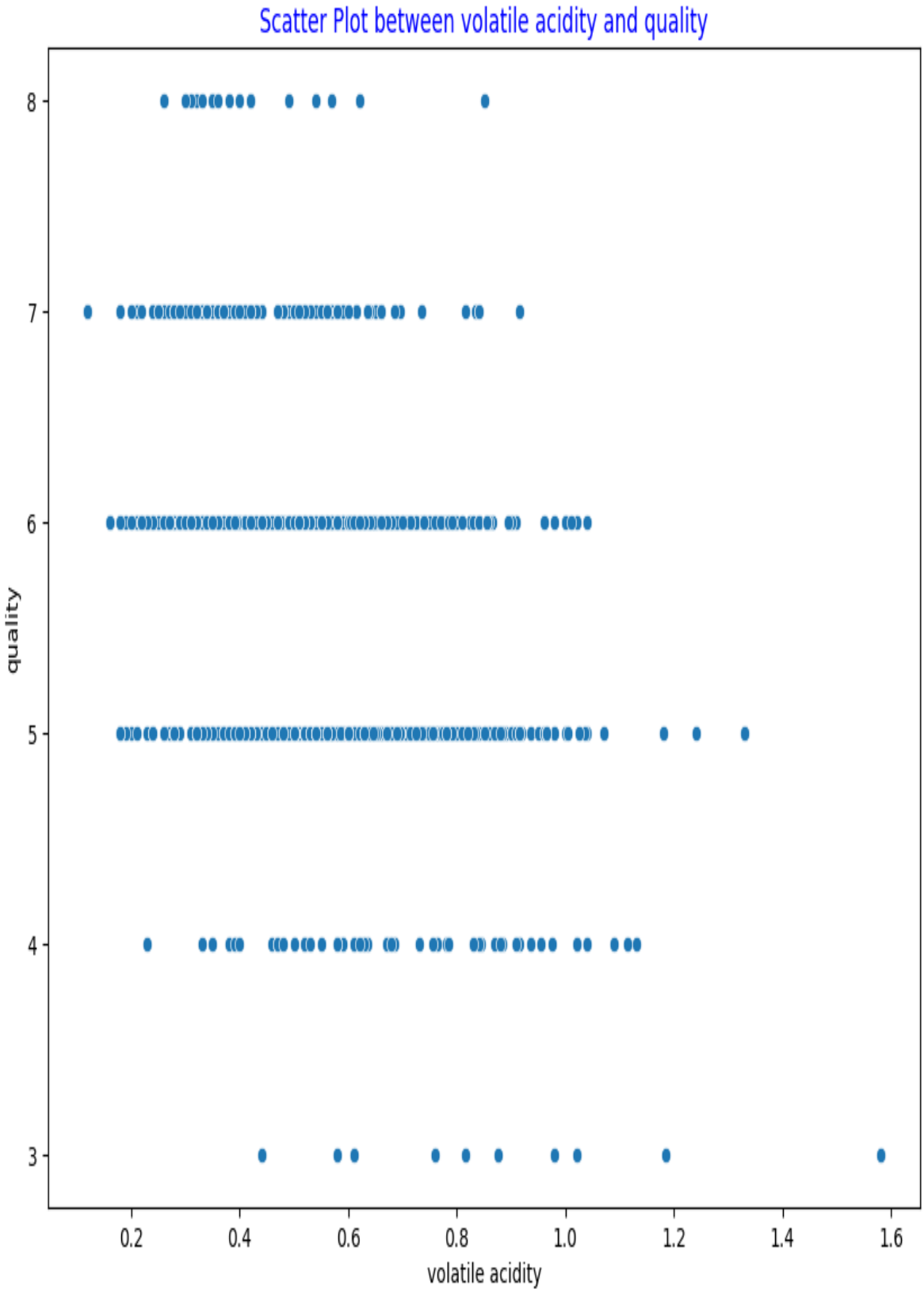

Scatter Plot between volatile acidity and total sulfur dioxide
total sulfur dioxide
volatile acidity
300
250
200
150
100
50
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

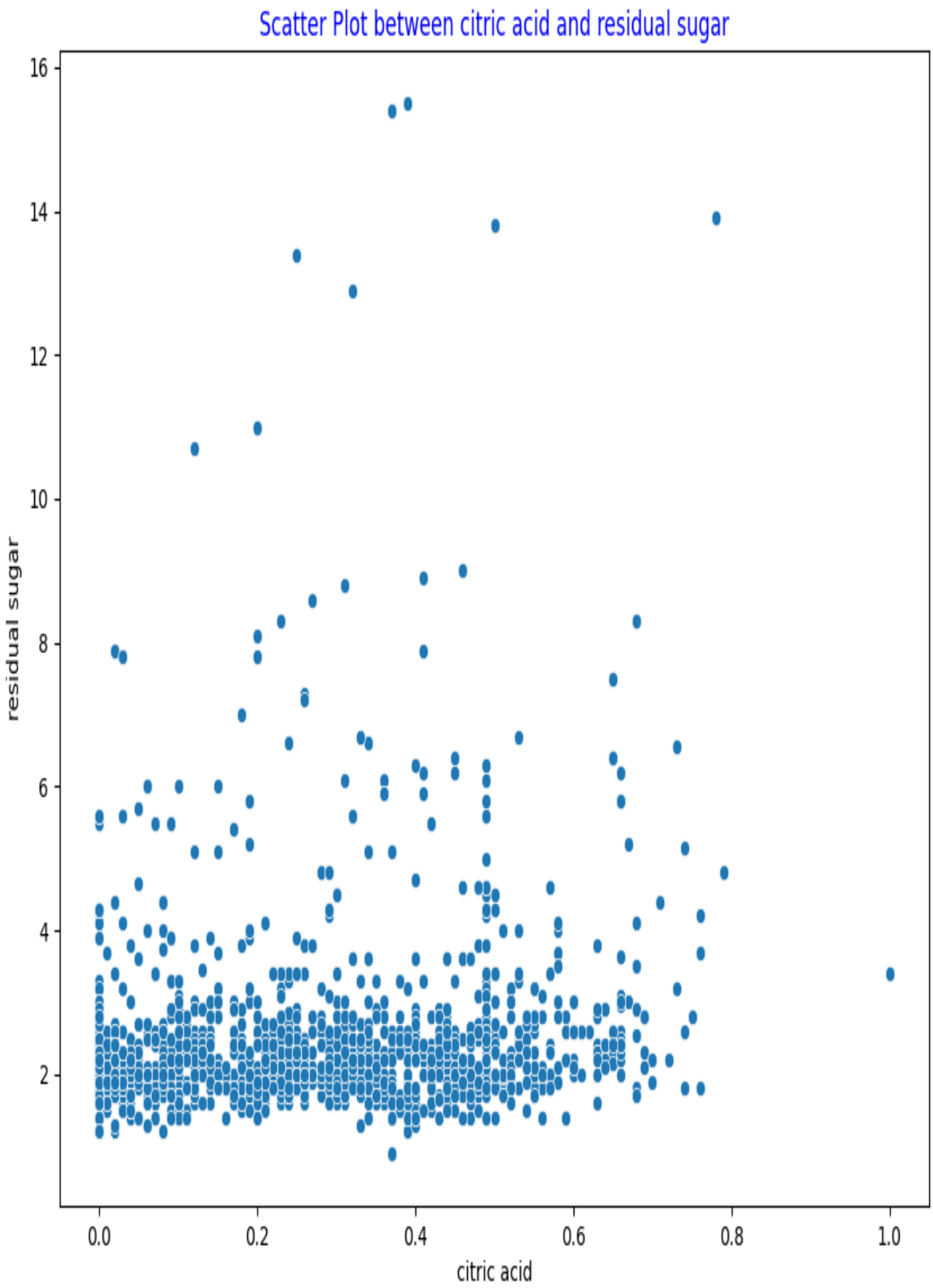

Scatter Plot between volatile acidity and density
density
volatile acidity
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

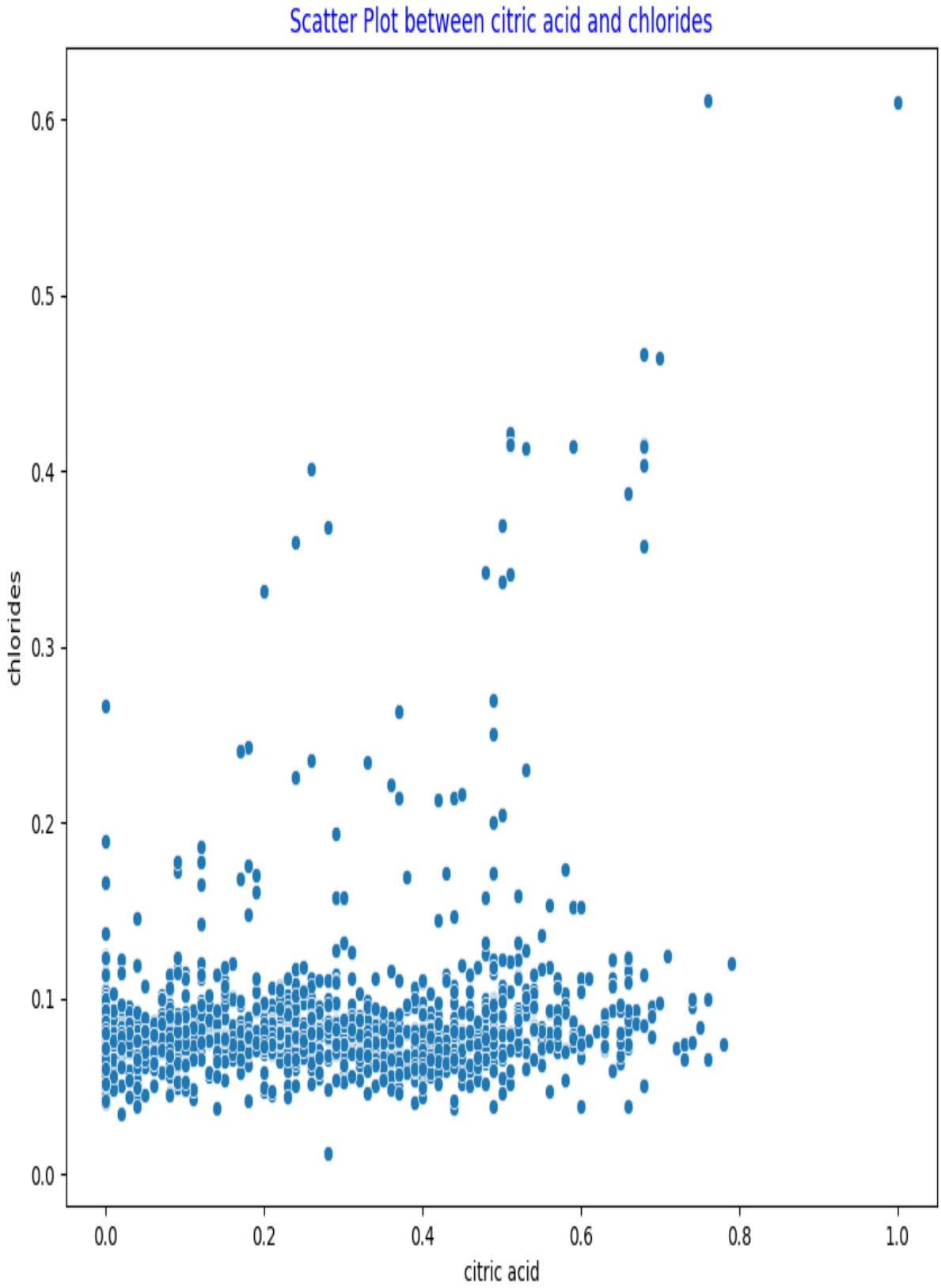

Scatter Plot between volatile acidity and pH
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
volatile acidity

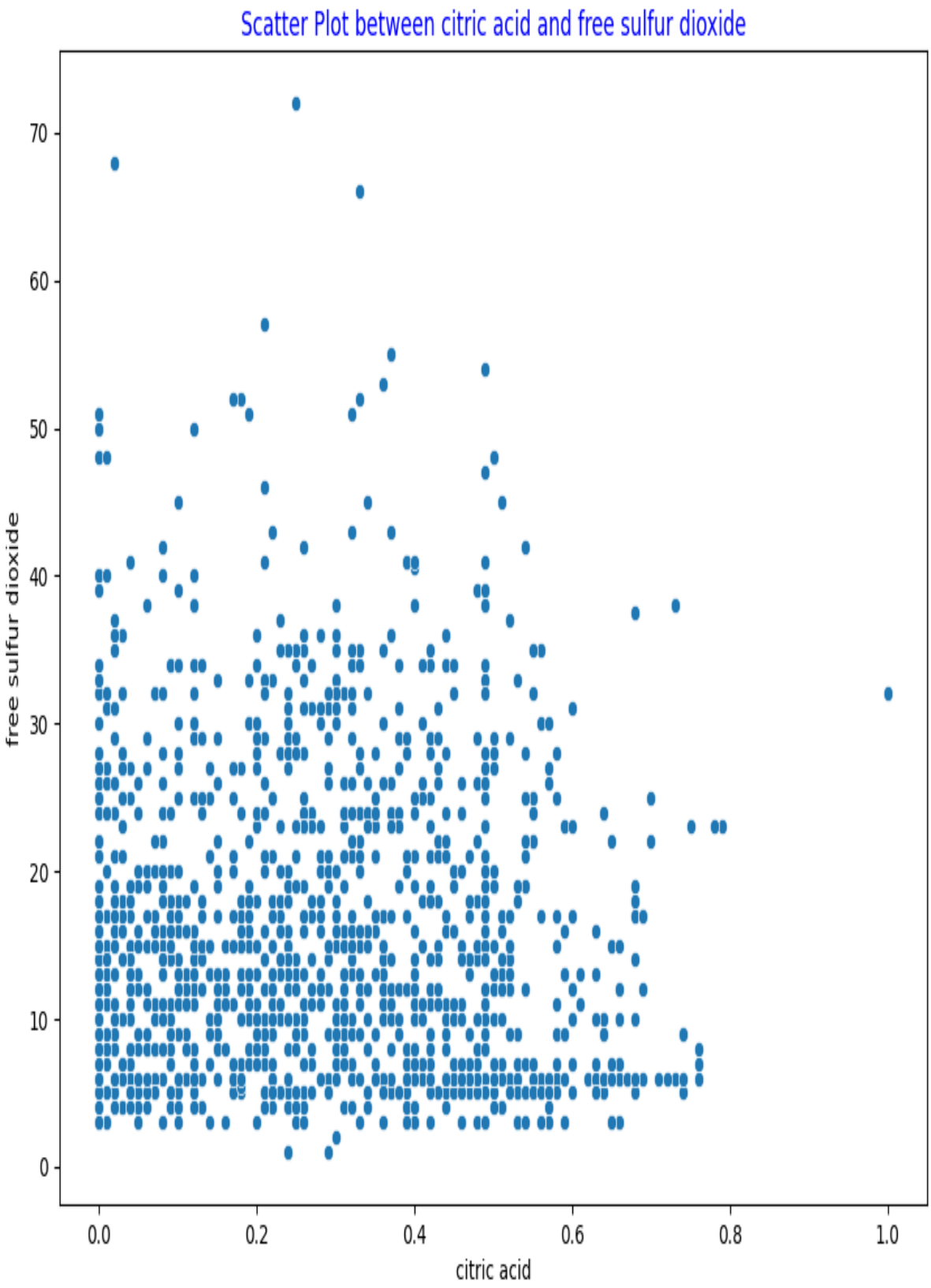

Scatter Plot between volatile acidity and sulphates
sulphates
volatile acidity
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

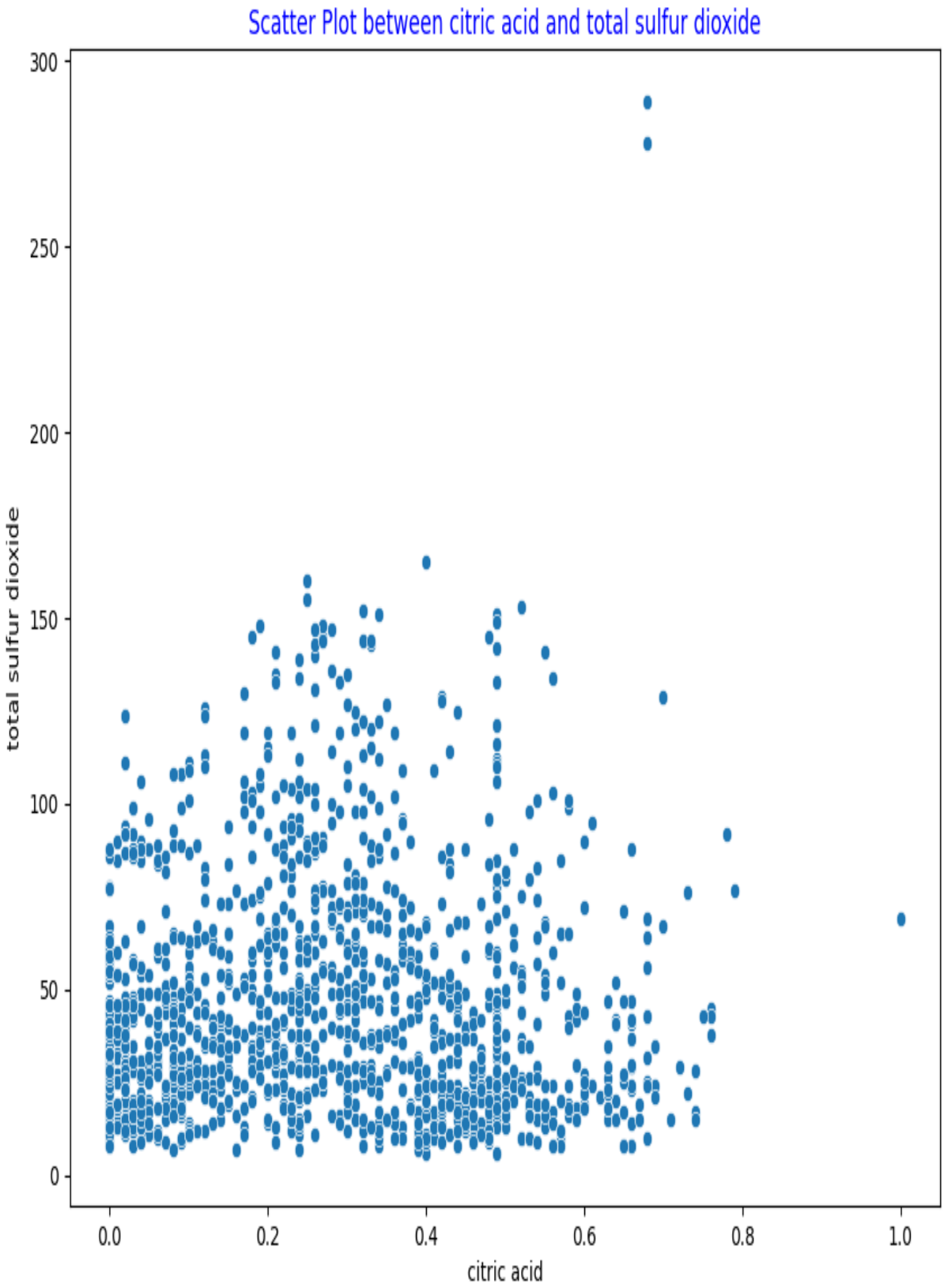

Scatter Plot between volatile acidity and alcohol
alcohol
volatile acidity
15
14
13
12
11
10
9
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

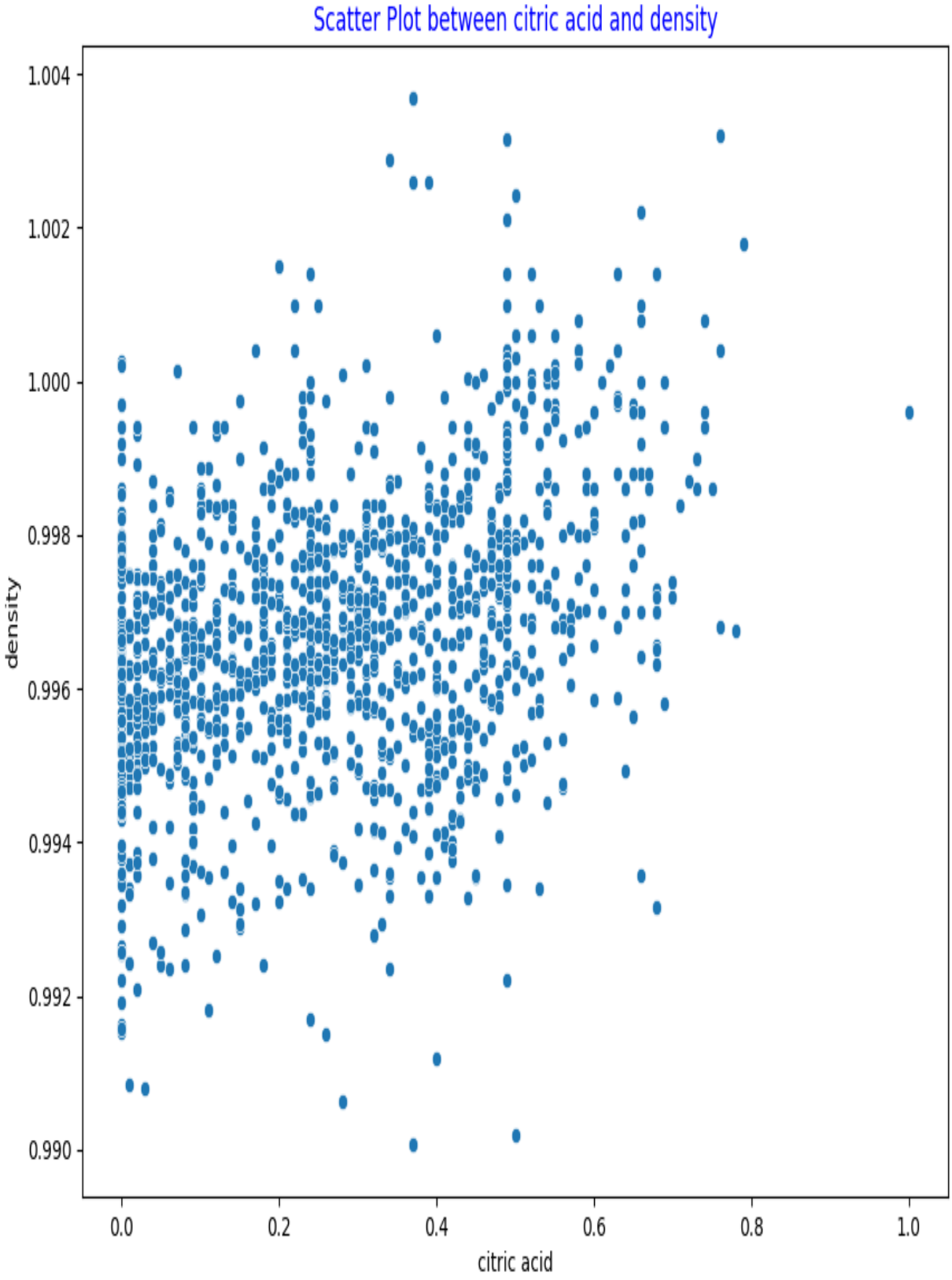

Scatter Plot between volatile acidity and quality
quality
volatile acidity
8
7
6
5
4
3
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

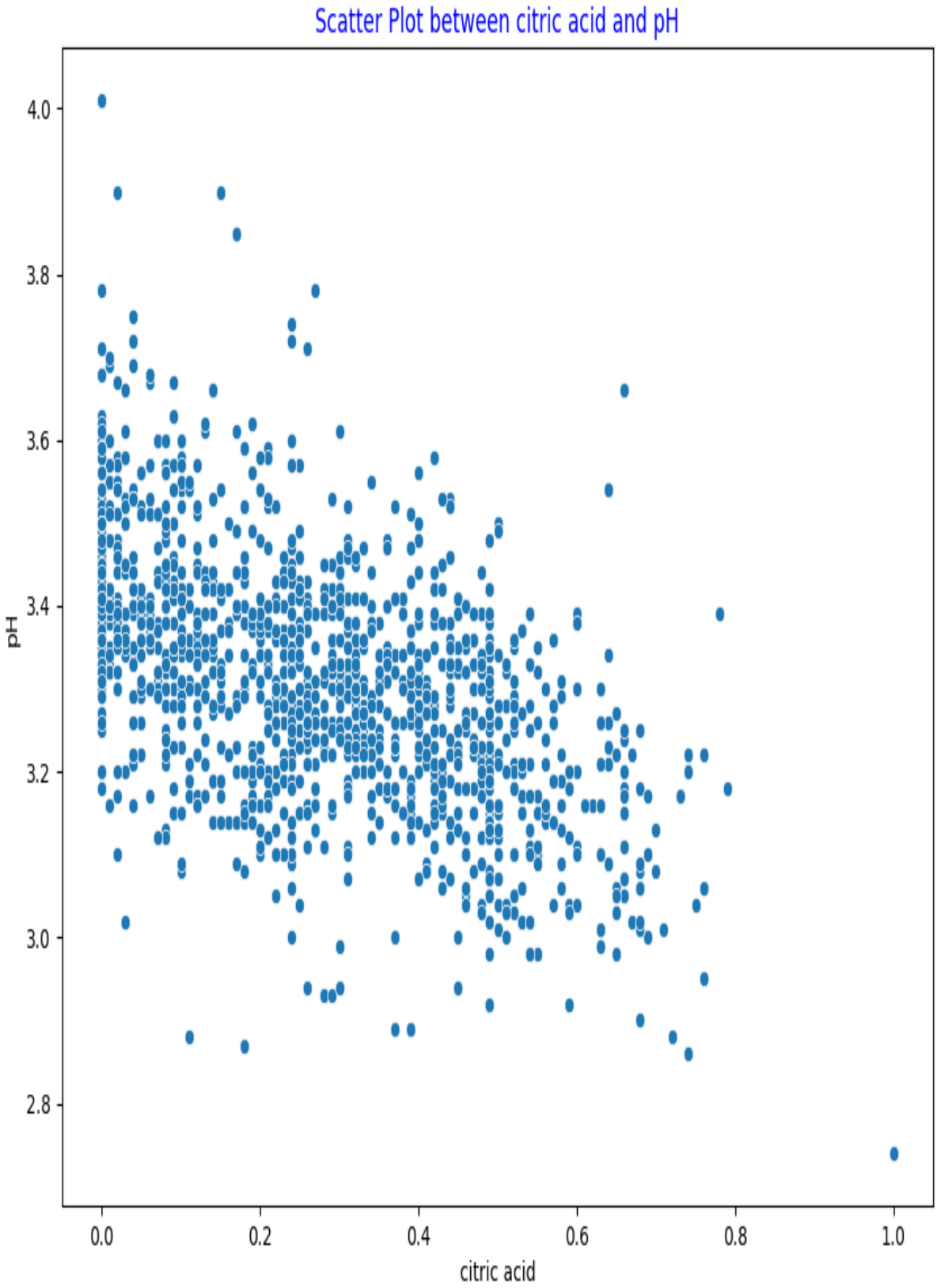

Scatter Plot between citric acid and residual sugar
residual sugar
citric acid
16
14
12
10
8
6
4
2
0.0
0.2
0.4
0.6
0.8
1.0

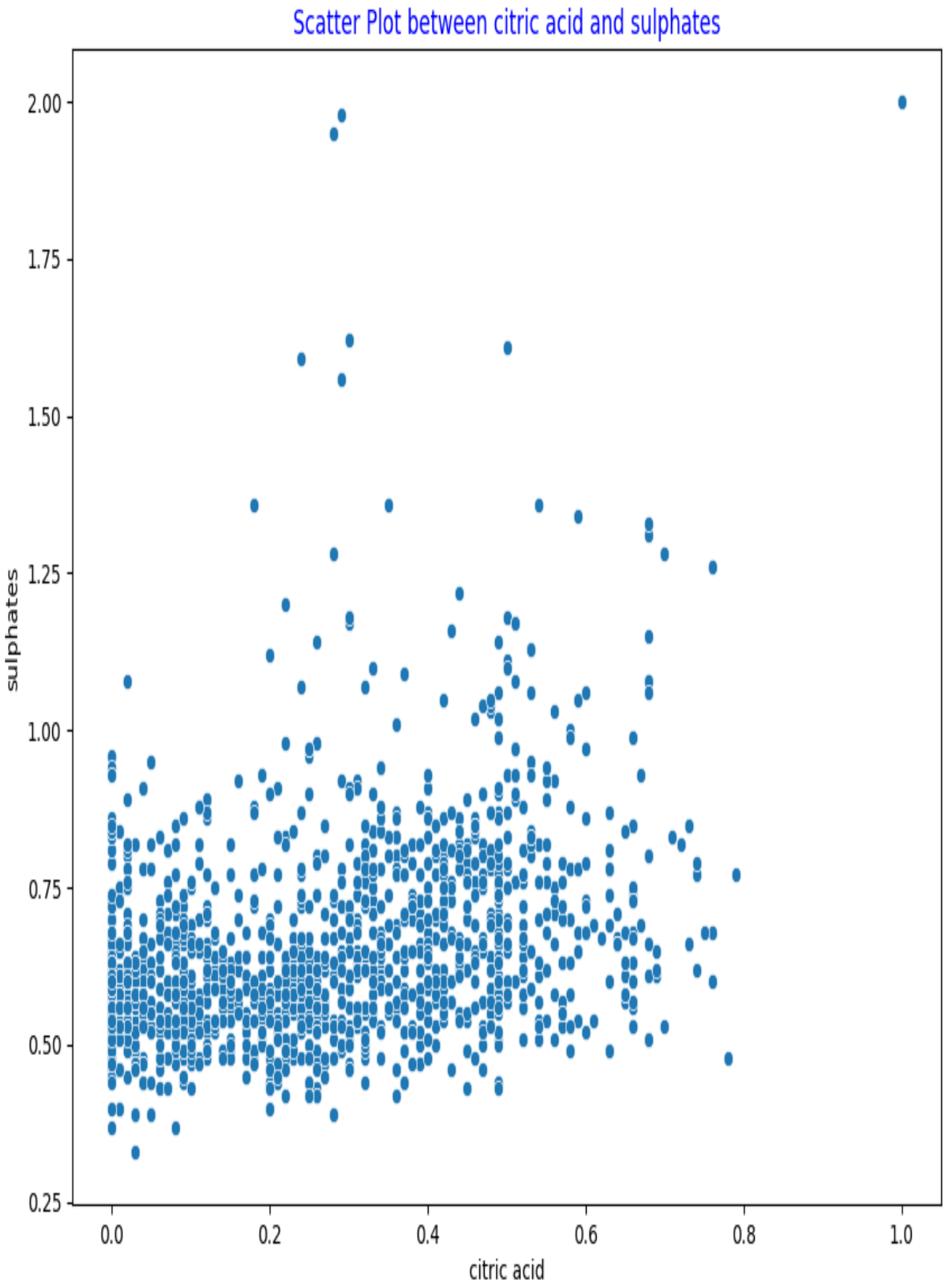

Scatter Plot between citric acid and chlorides
chlorides
citric acid
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.0
0.2
0.4
0.6
0.8
1.0

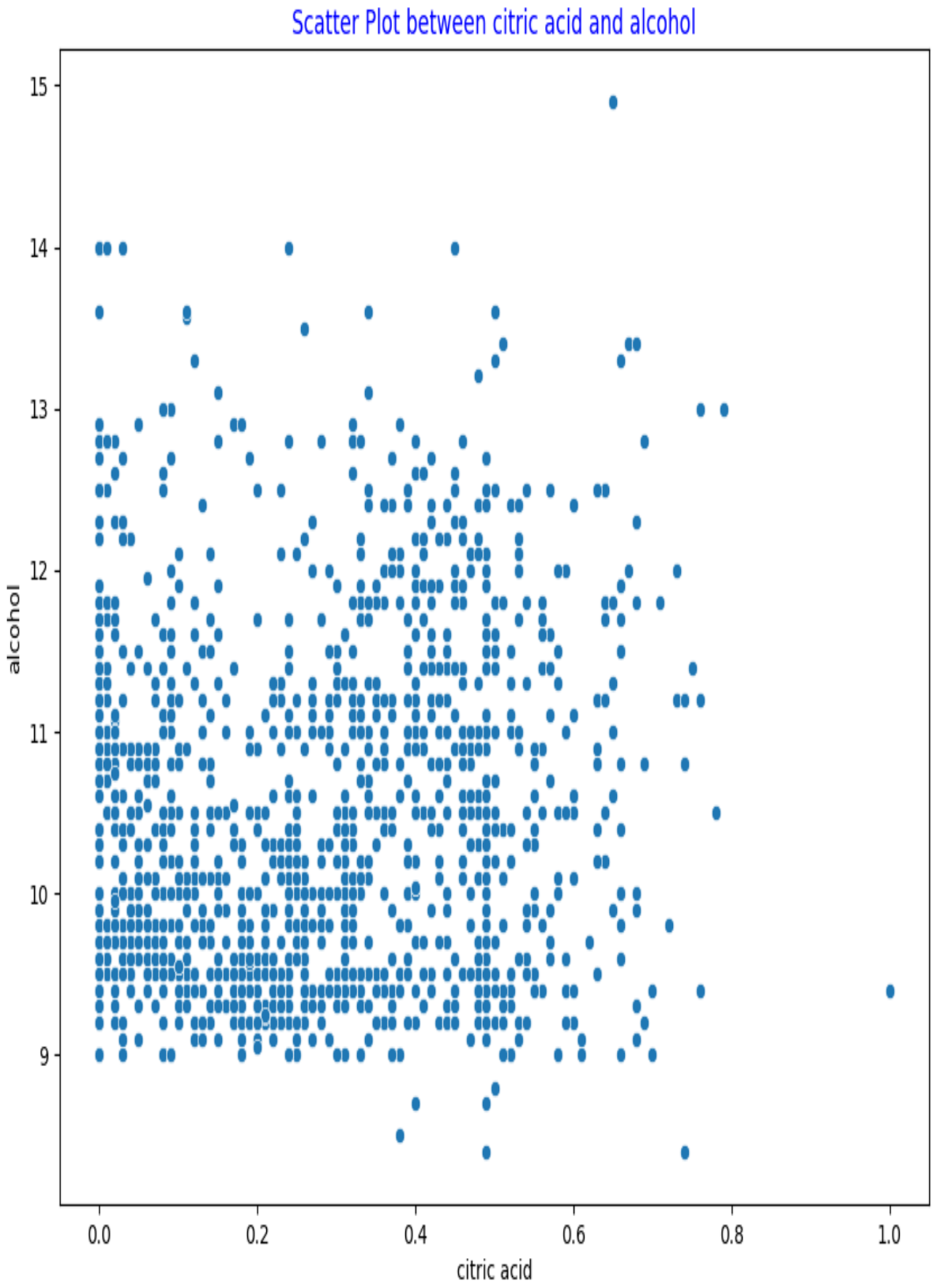

Scatter Plot between citric acid and free sulfur dioxide
free sulfur dioxide
citric acid
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0

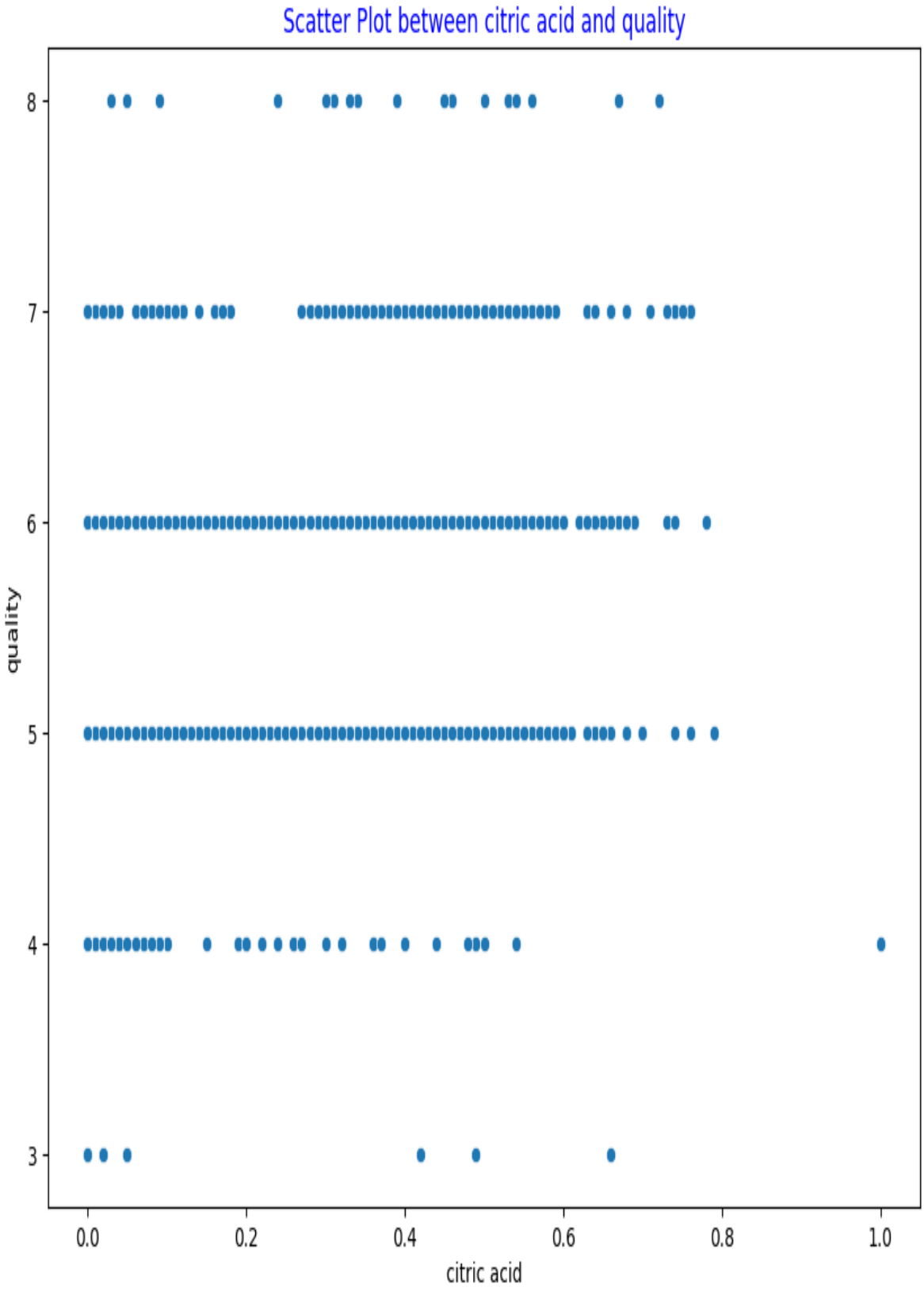

Scatter Plot between citric acid and total sulfur dioxide
total sulfur dioxide
citric acid
300
250
200
150
100
50
0
0.0
0.2
0.4
0.6
0.8
1.0

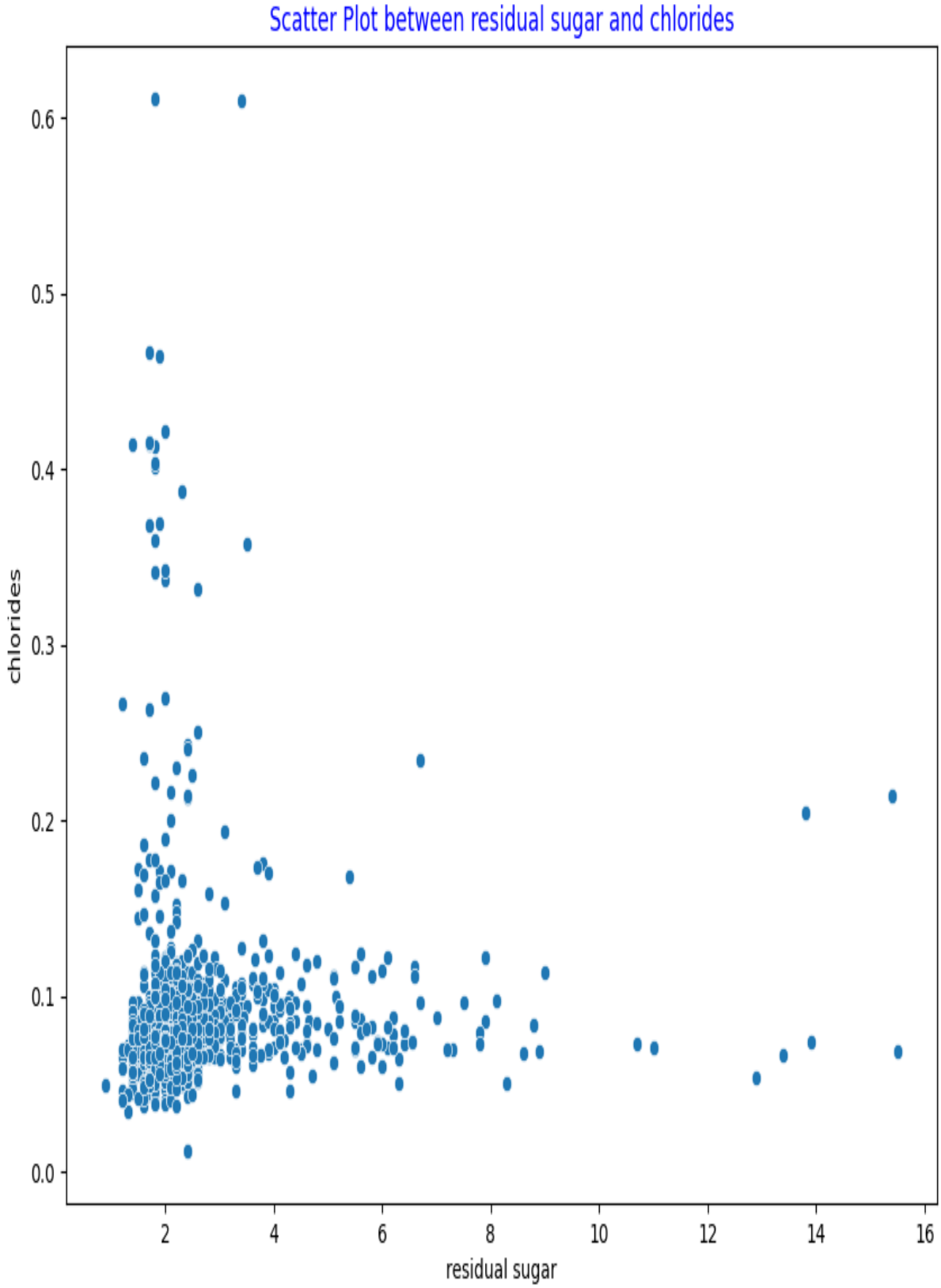

Scatter Plot between citric acid and density
density
citric acid
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
0.0
0.2
0.4
0.6
0.8
1.0

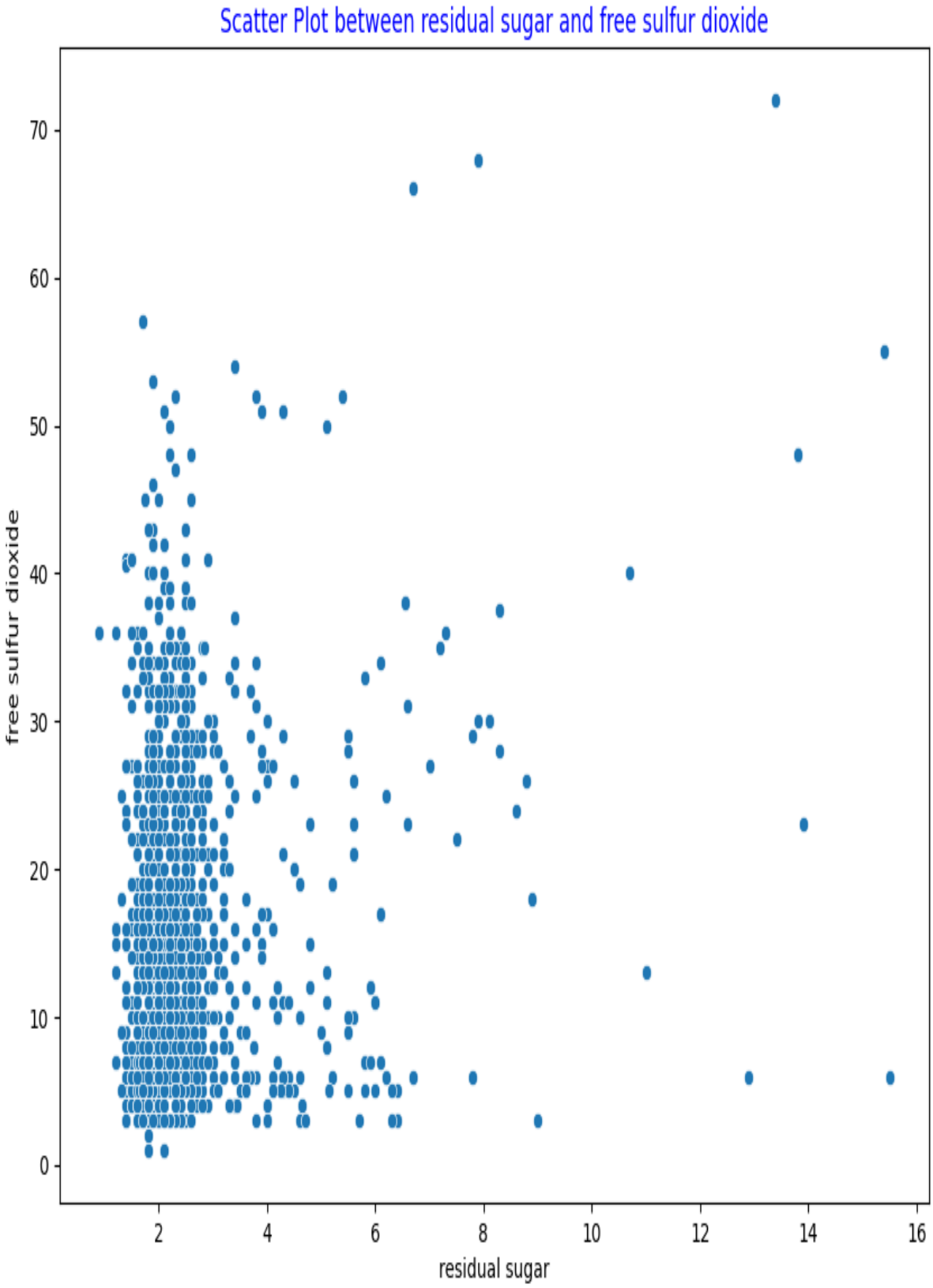

Scatter Plot between citric acid and pH
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8
0.0
0.2
0.4
0.6
0.8
1.0
citric acid

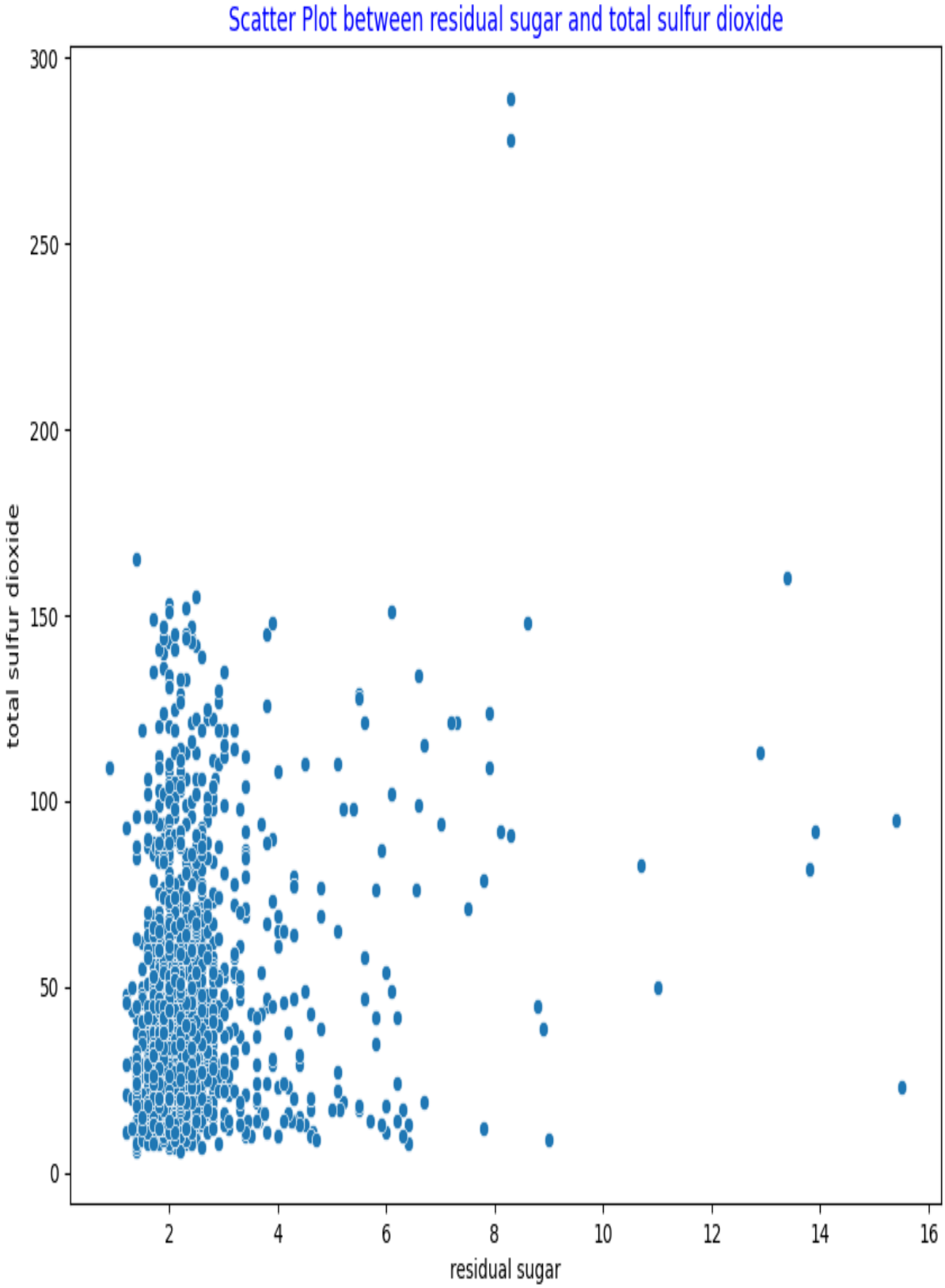

Scatter Plot between citric acid and sulphates
sulphates
citric acid
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.0
0.2
0.4
0.6
0.8
1.0

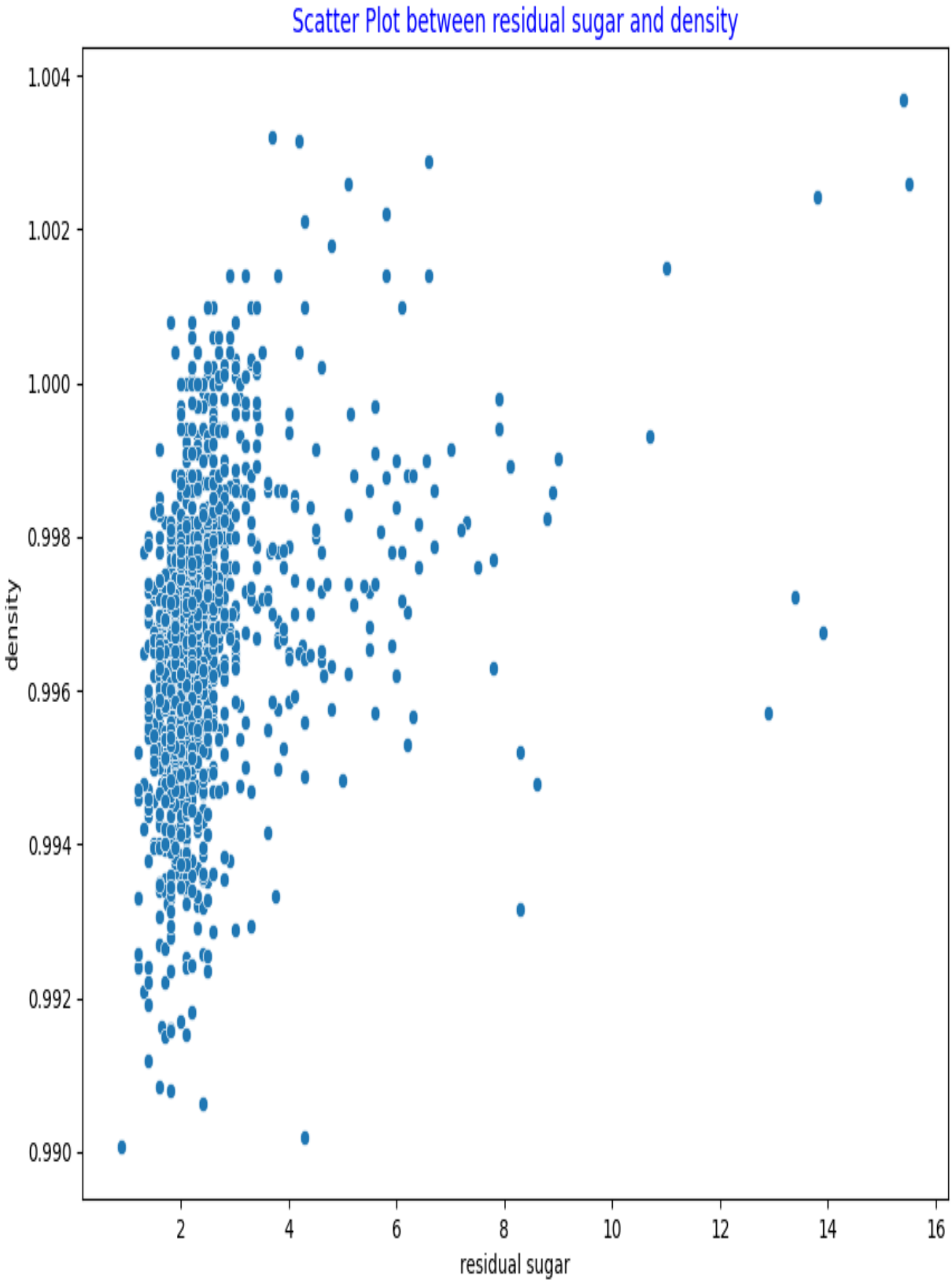

Scatter Plot between citric acid and alcohol
alcohol
citric acid
15
14
13
12
11
10
9
0.0
0.2
0.4
0.6
0.8
1.0

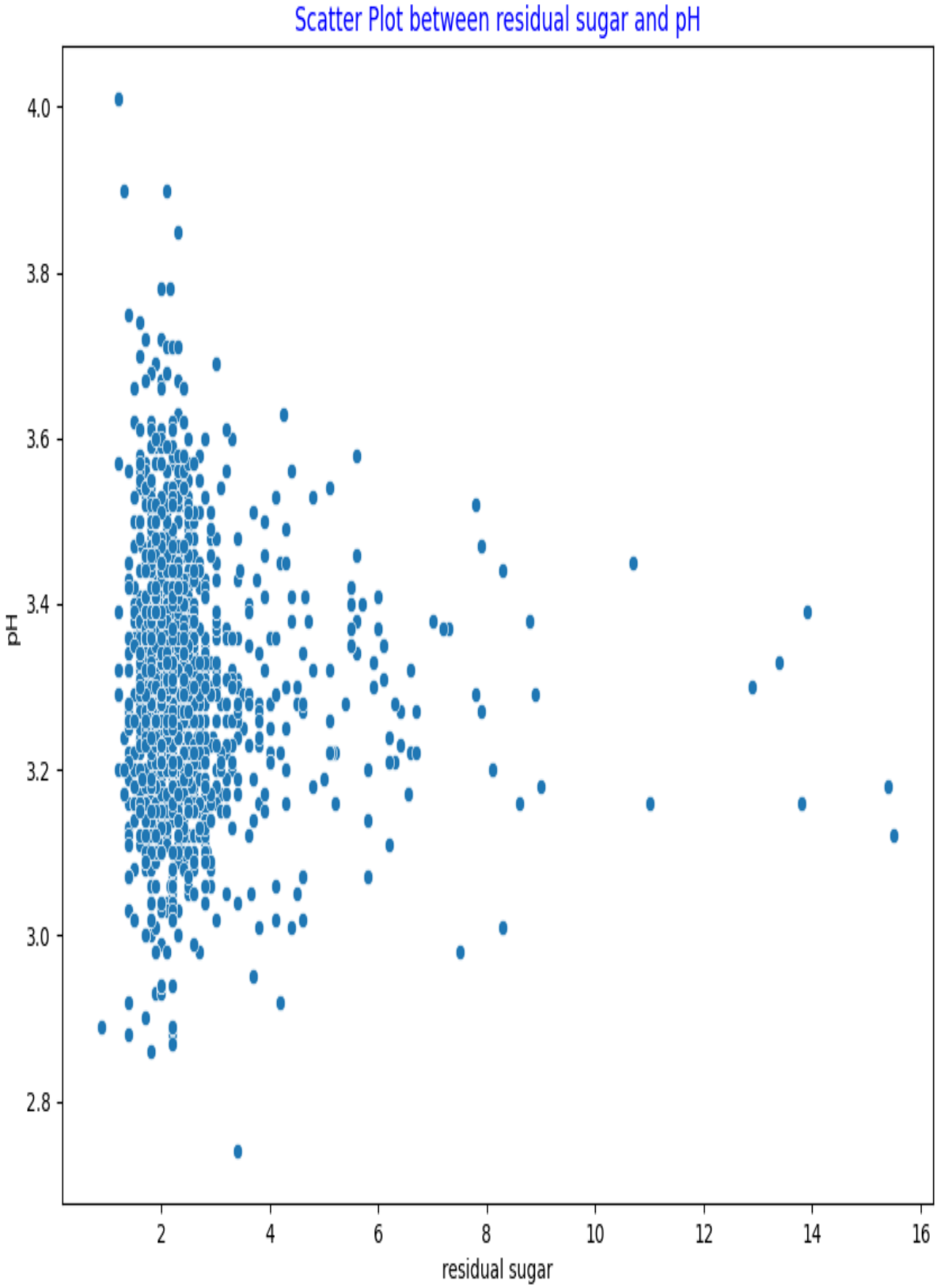

Scatter Plot between citric acid and quality
quality
citric acid
8
7
6
5
4
3
0.0
0.2
0.4
0.6
0.8
1.0

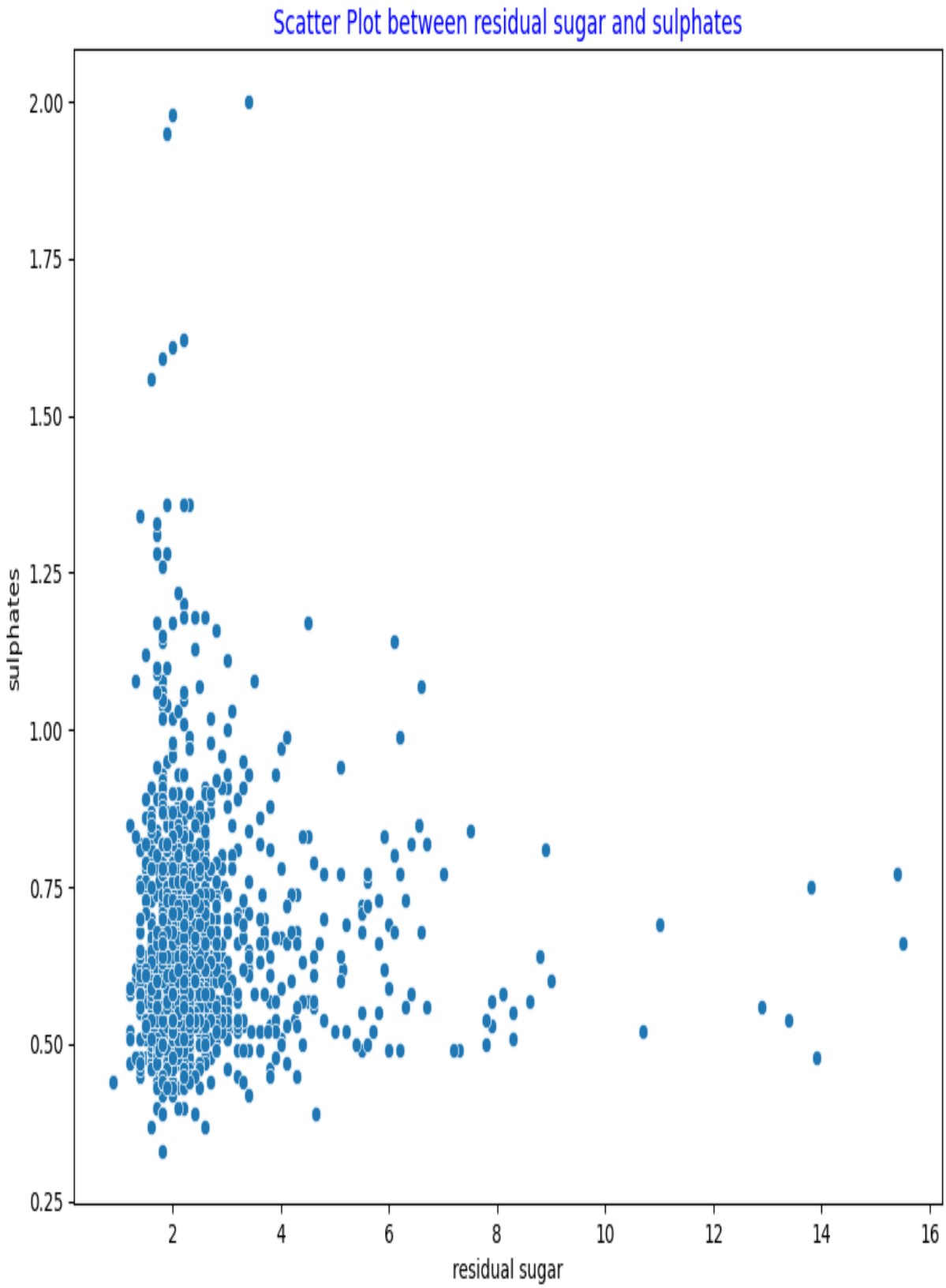

Scatter Plot between residual sugar and chlorides
chlorides
residual sugar
0.0
0.1
0.2
0.3
0.4
0.5
0.6
2
4
6
8
10
12
14
16

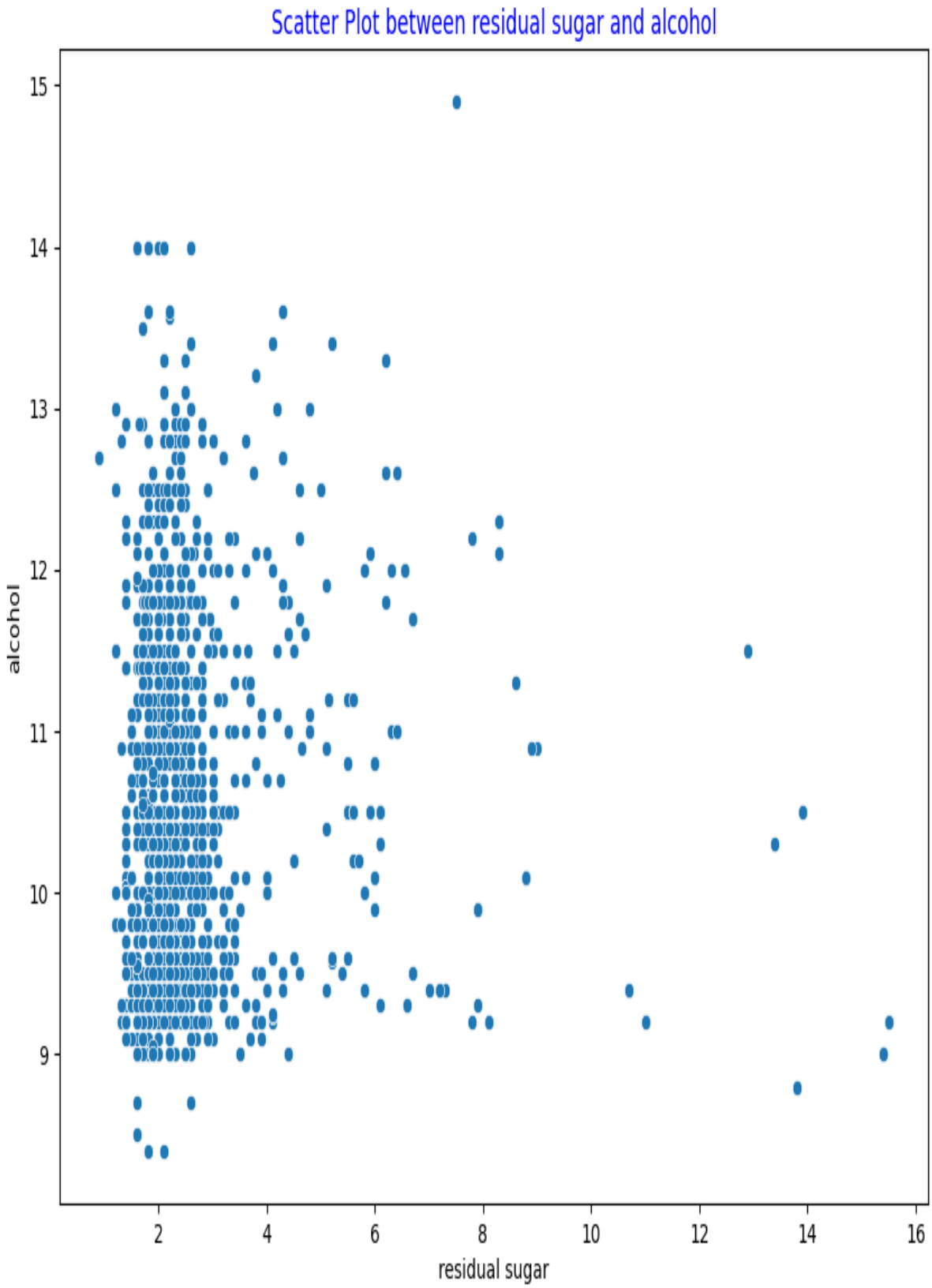

Scatter Plot between residual sugar and free sulfur dioxide
free sulfur dioxide
residual sugar
0
10
20
30
40
50
60
70
2
4
6
8
10
12
14
16

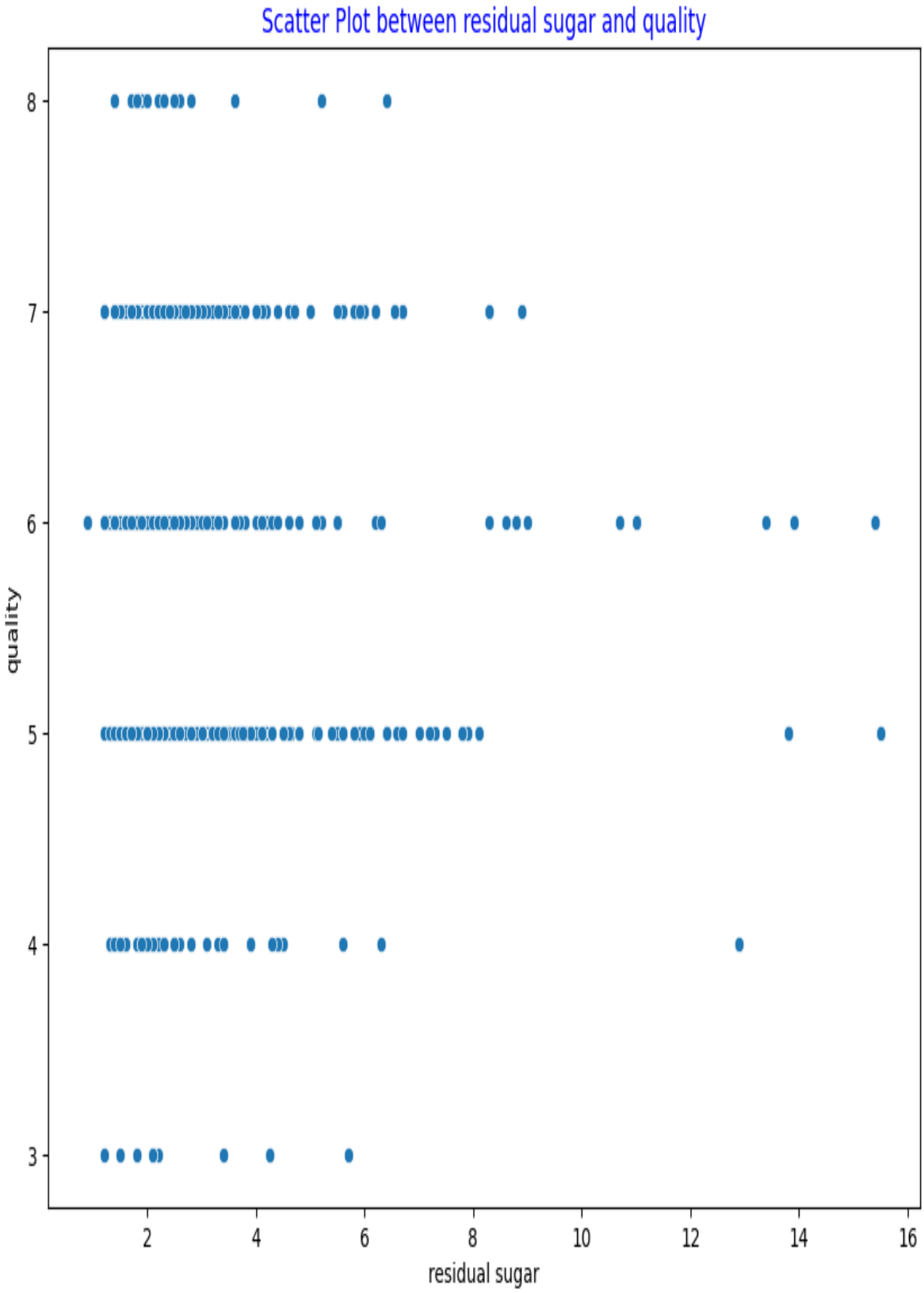

Scatter Plot between residual sugar and total sulfur dioxide
total sulfur dioxide
residual sugar
300
250
200
150
100
50
0
2
4
6
8
10
12
14
16

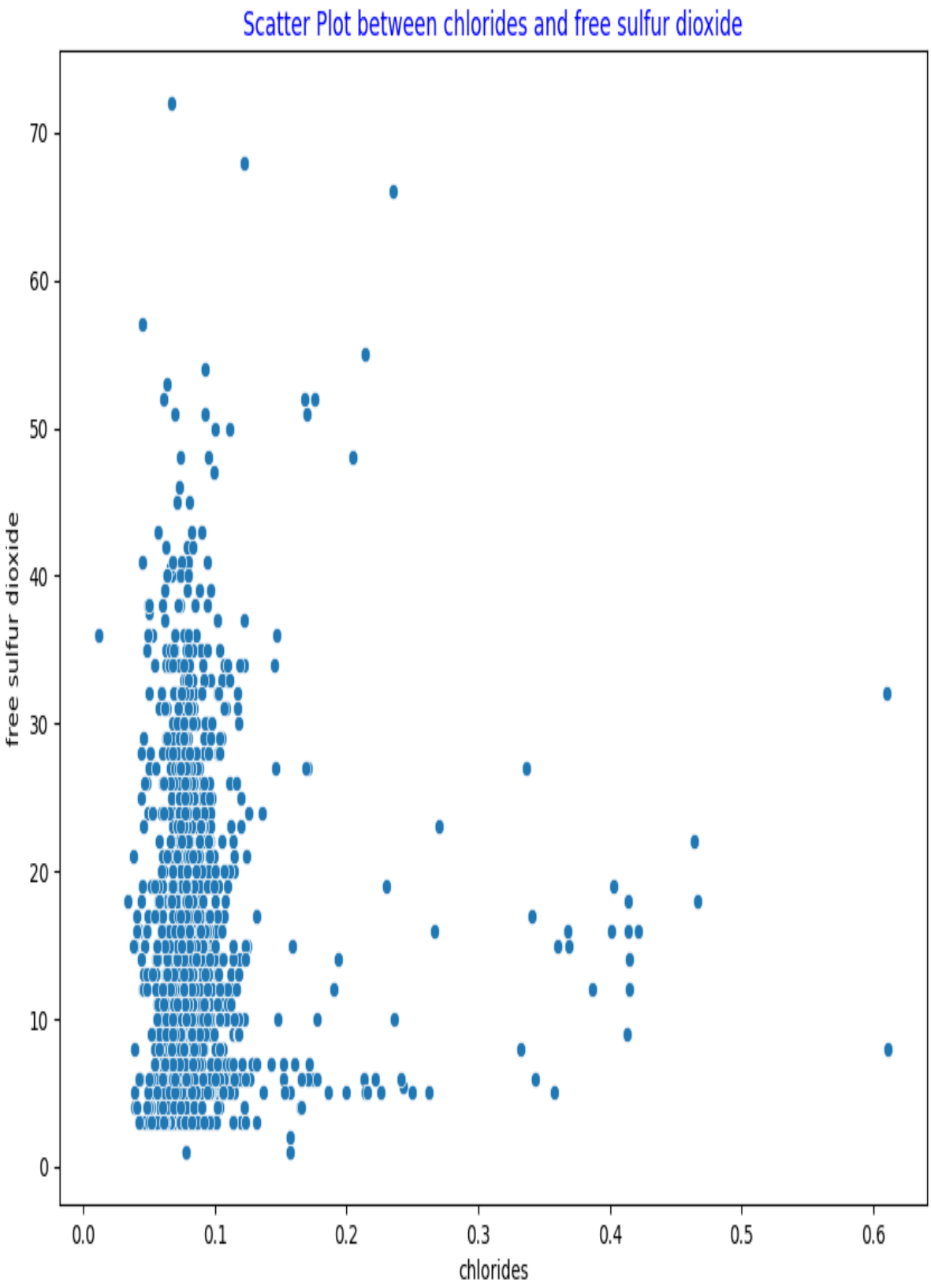

Scatter Plot between residual sugar and density
density
residual sugar
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
2
4
6
8
10
12
14
16

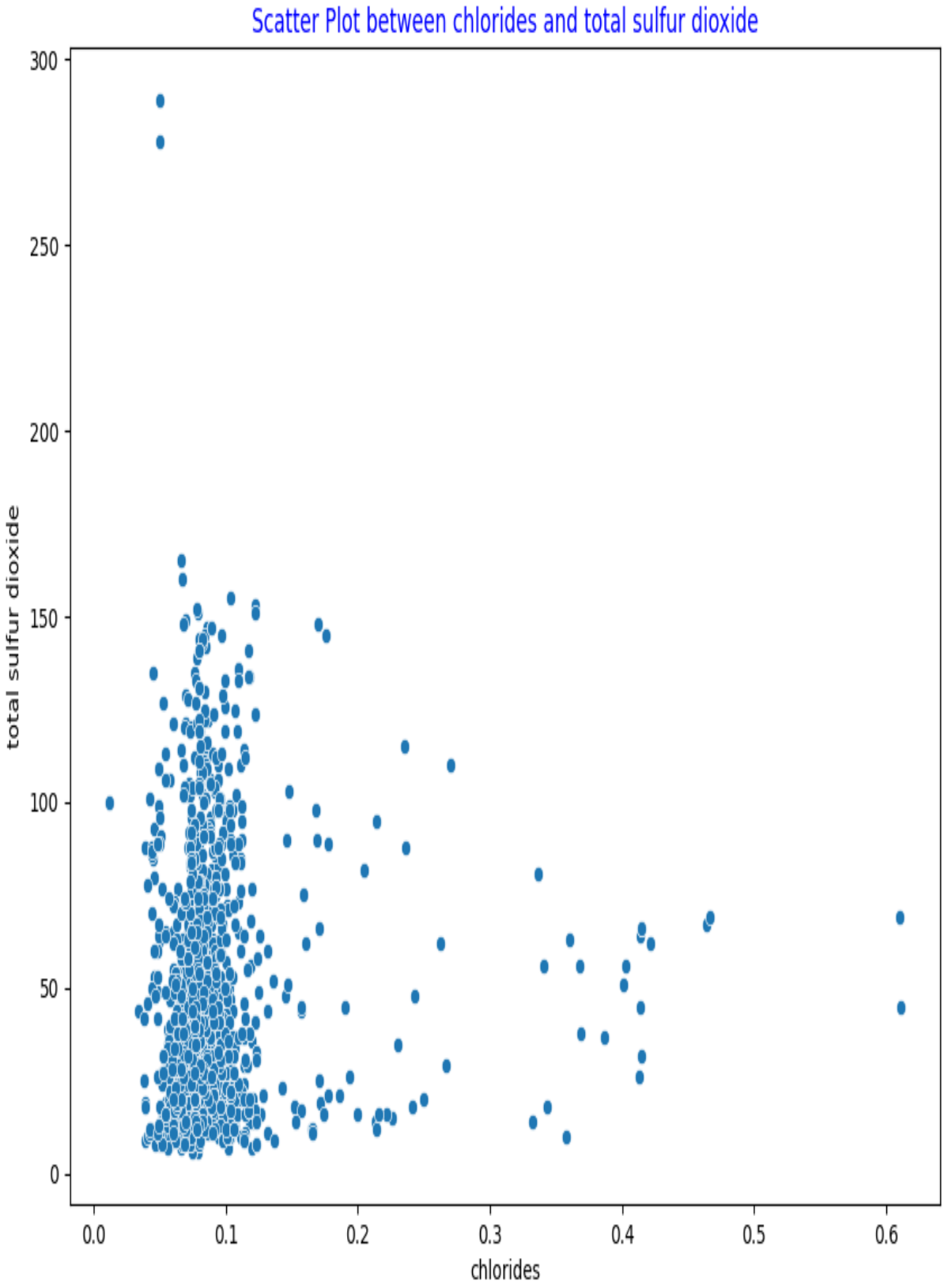

Scatter Plot between residual sugar and pH
pH
residual sugar
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2
4
6
8
10
12
14
16

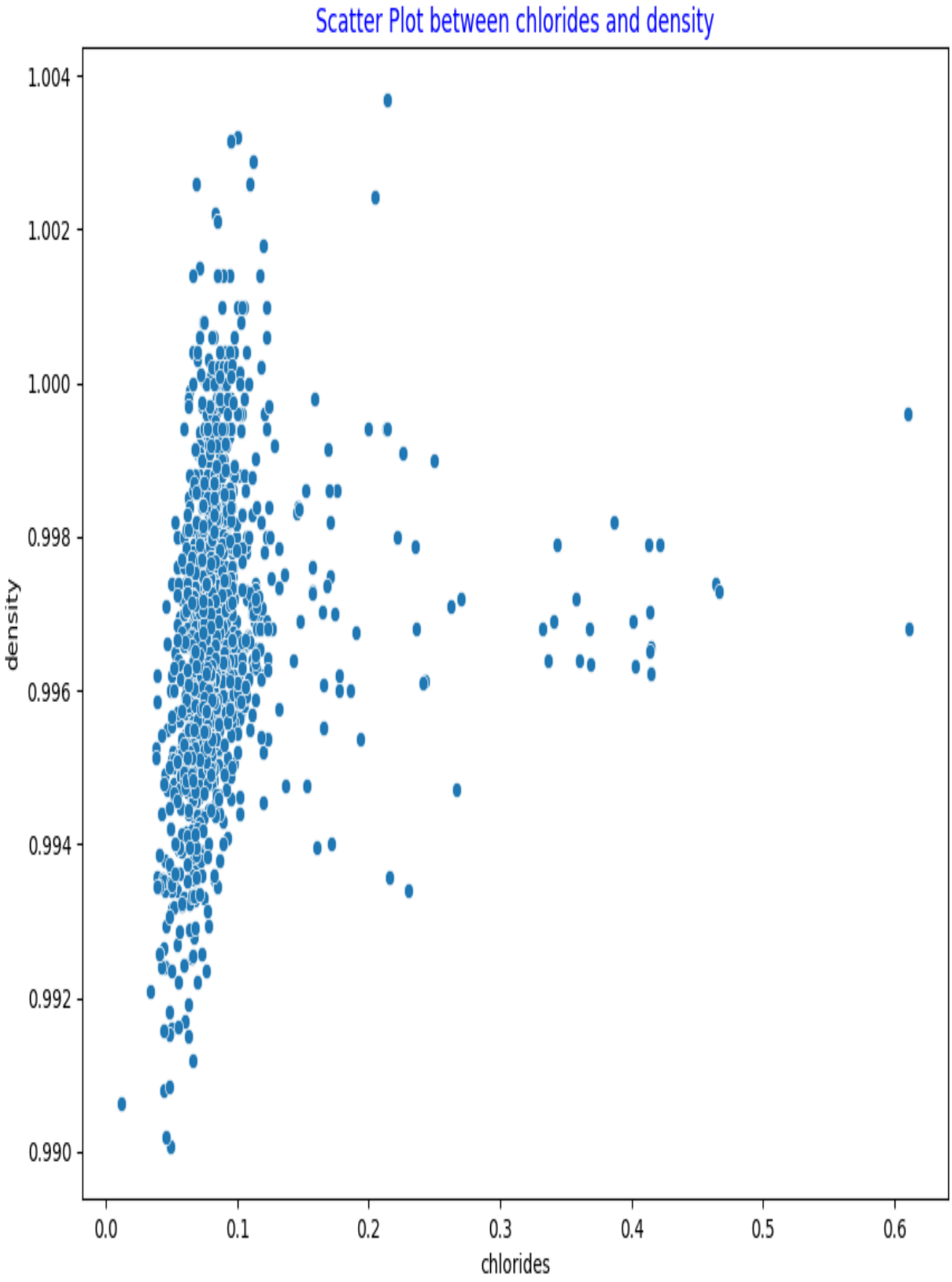

Scatter Plot between residual sugar and sulphates
sulphates
residual sugar
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
2
4
6
8
10
12
14
16

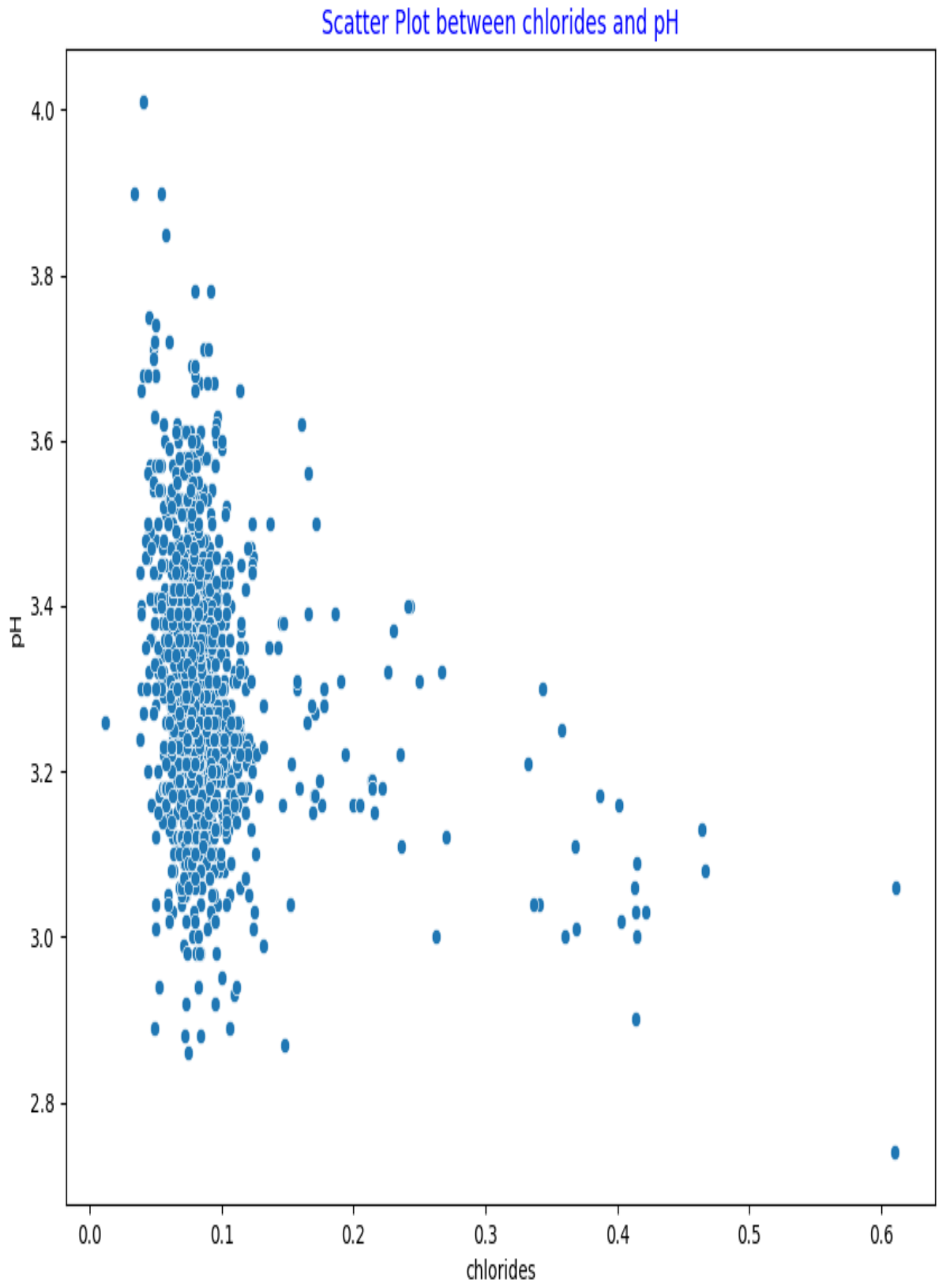

Scatter Plot between residual sugar and alcohol
alcohol
residual sugar
15
14
13
12
11
10
9
2
4
6
8
10
12
14
16

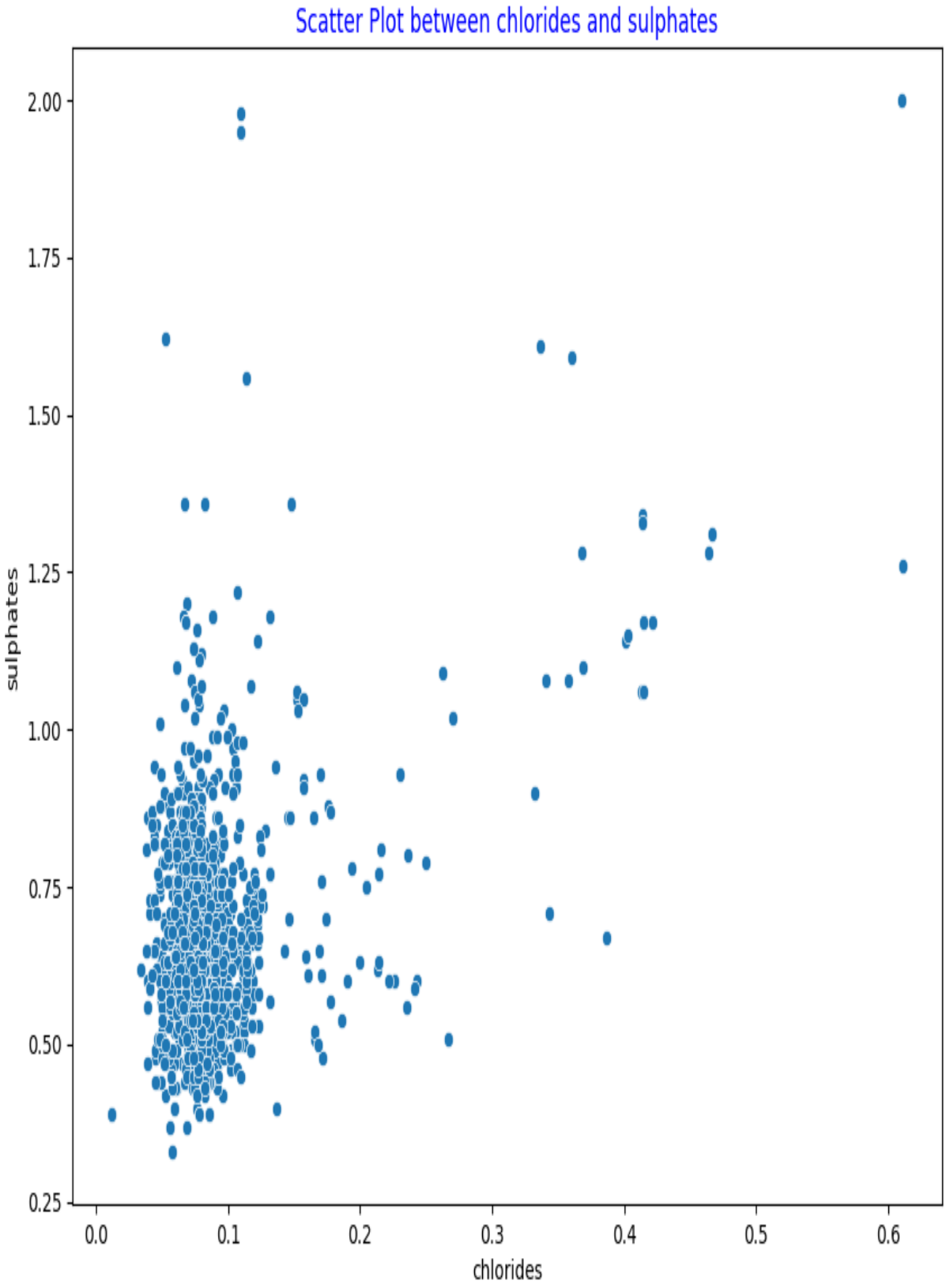

Scatter Plot between residual sugar and quality
quality
residual sugar
8
7
6
5
4
3
2
4
6
8
10
12
14
16

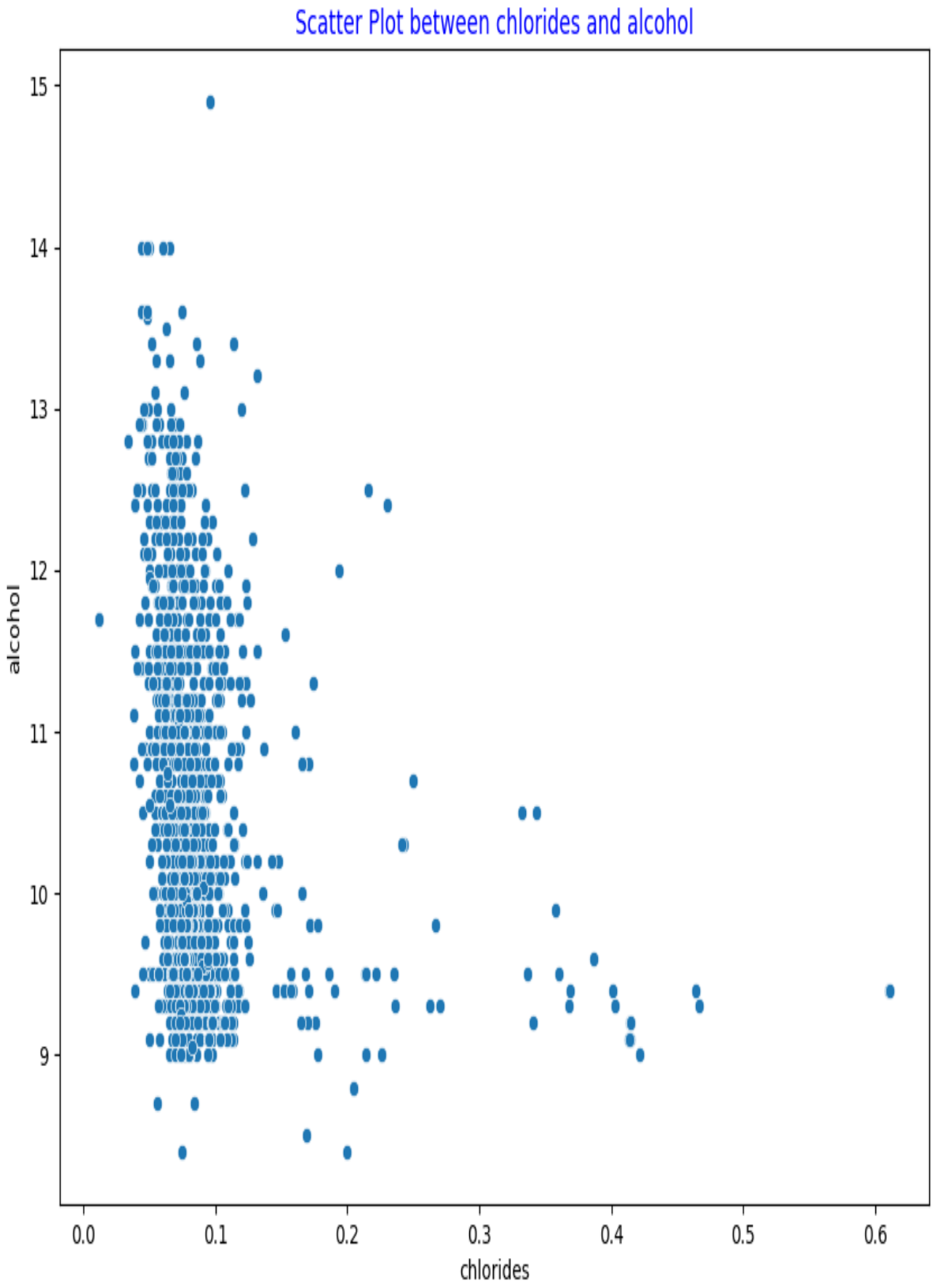

Scatter Plot between chlorides and free sulfur dioxide
free sulfur dioxide
chlorides
0
10
20
30
40
50
60
70
0.0
0.1
0.2
0.3
0.4
0.5
0.6

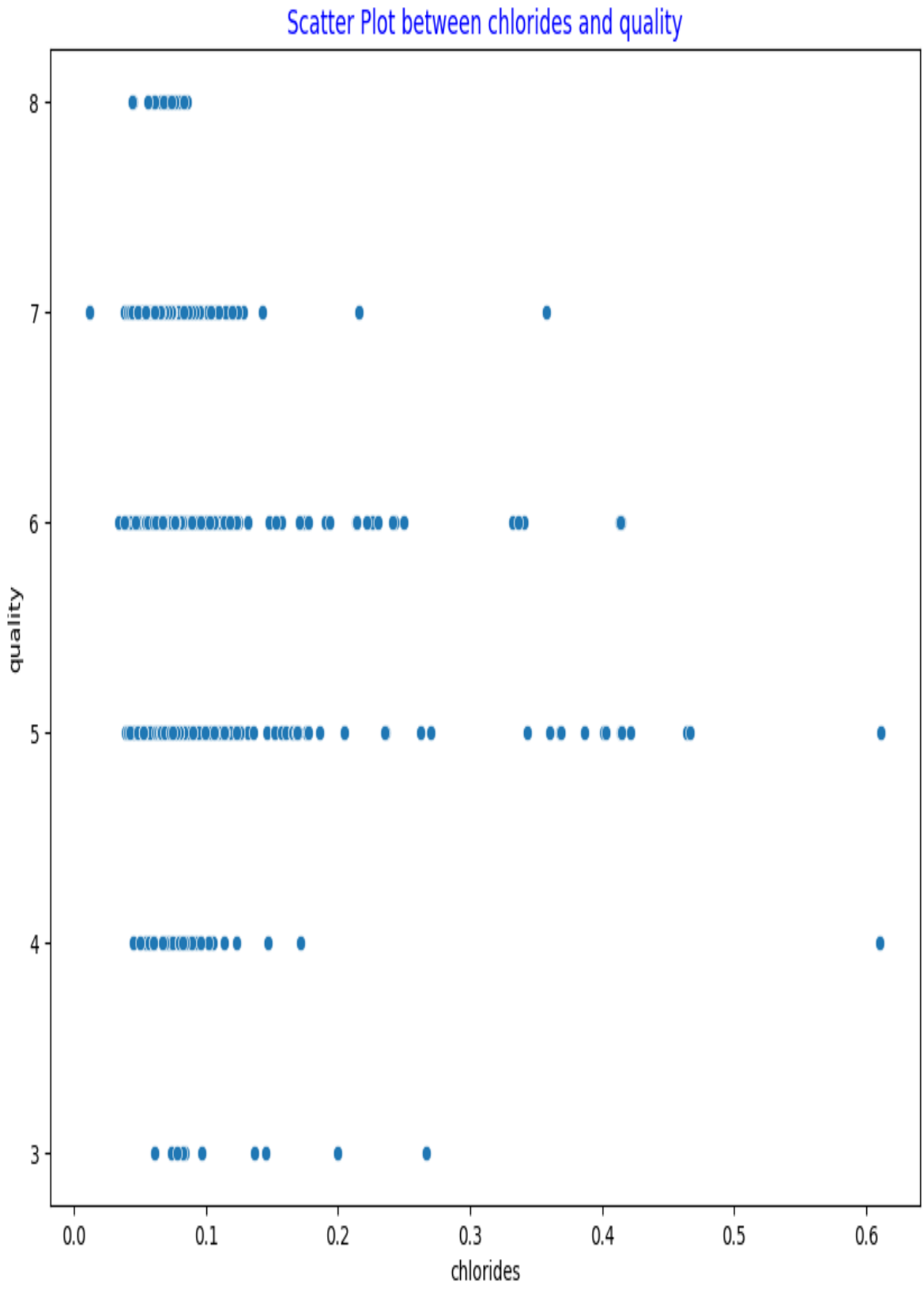

Scatter Plot between chlorides and total sulfur dioxide
total sulfur dioxide
chlorides
300
250
200
150
100
50
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6

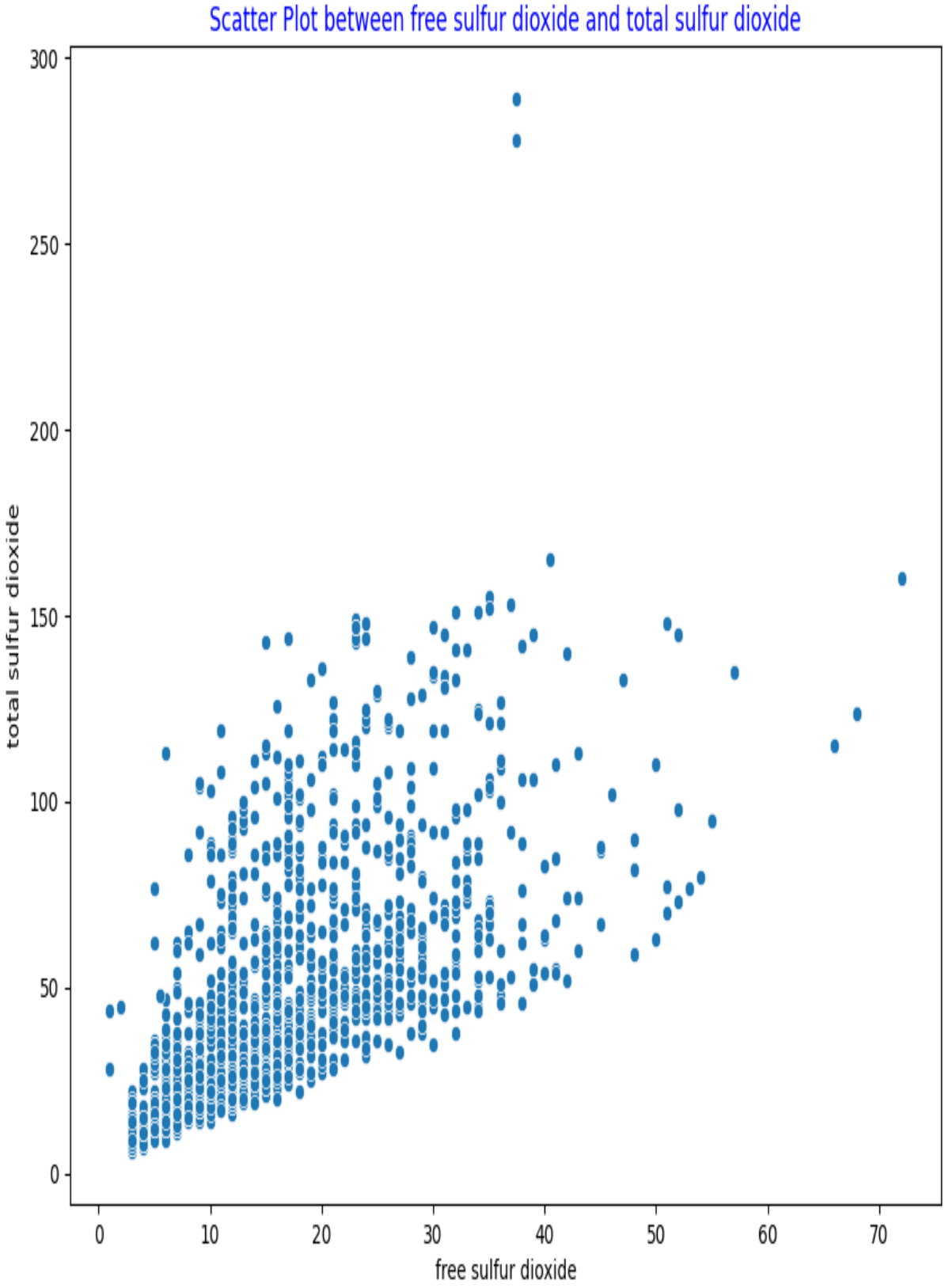

Scatter Plot between chlorides and density
density
chlorides
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
0.0
0.1
0.2
0.3
0.4
0.5
0.6

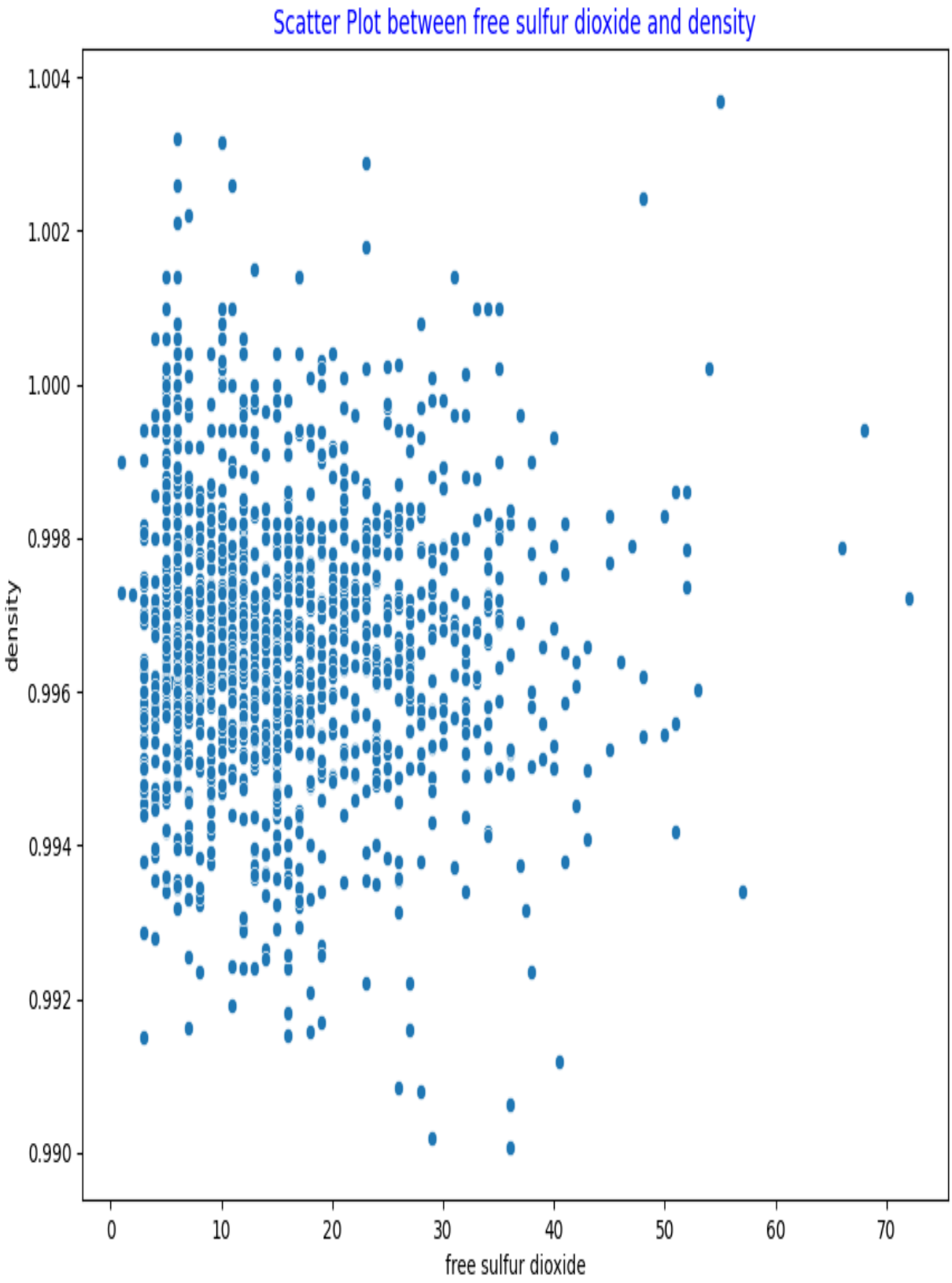

Scatter Plot between chlorides and pH
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8
0.0
0.1
0.2
0.3
0.4
0.5
0.6
chlorides

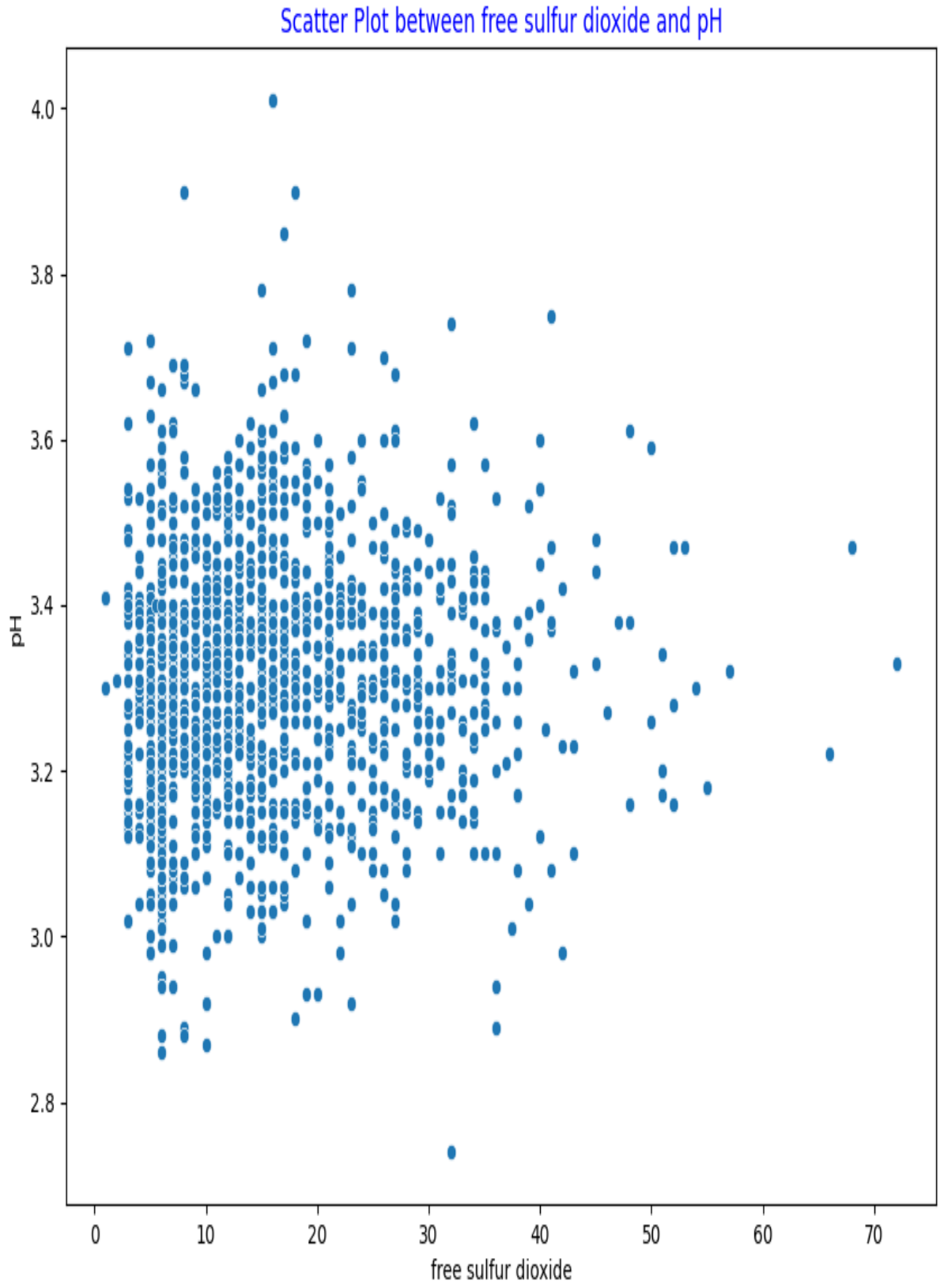

Scatter Plot between chlorides and sulphates
sulphates
chlorides
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.0
0.1
0.2
0.3
0.4
0.5
0.6

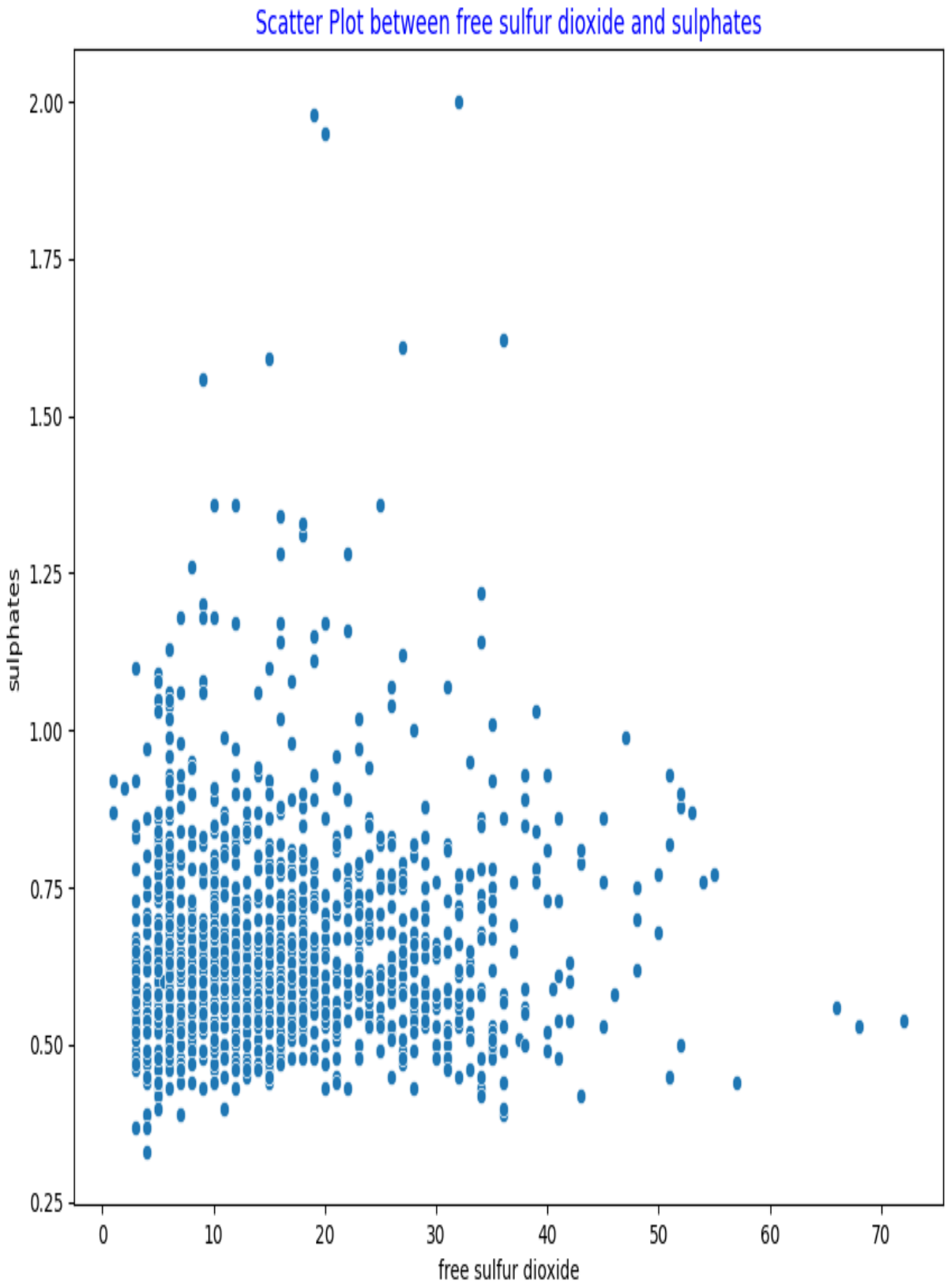

Scatter Plot between chlorides and alcohol
alcohol
chlorides
15
14
13
12
11
10
9
0.0
0.1
0.2
0.3
0.4
0.5
0.6

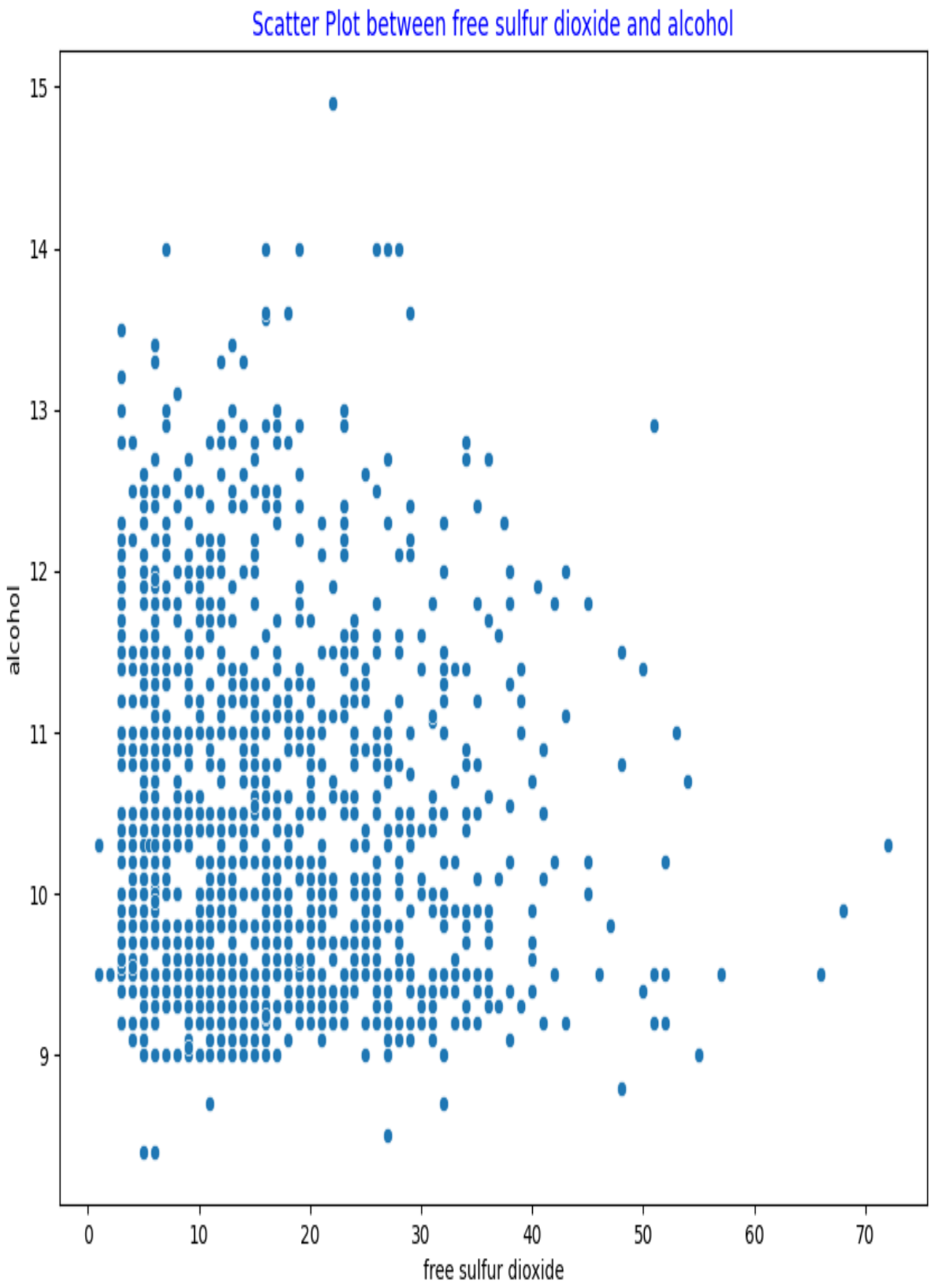

Scatter Plot between chlorides and quality
quality
chlorides
8
7
6
5
4
3
0.0
0.1
0.2
0.3
0.4
0.5
0.6

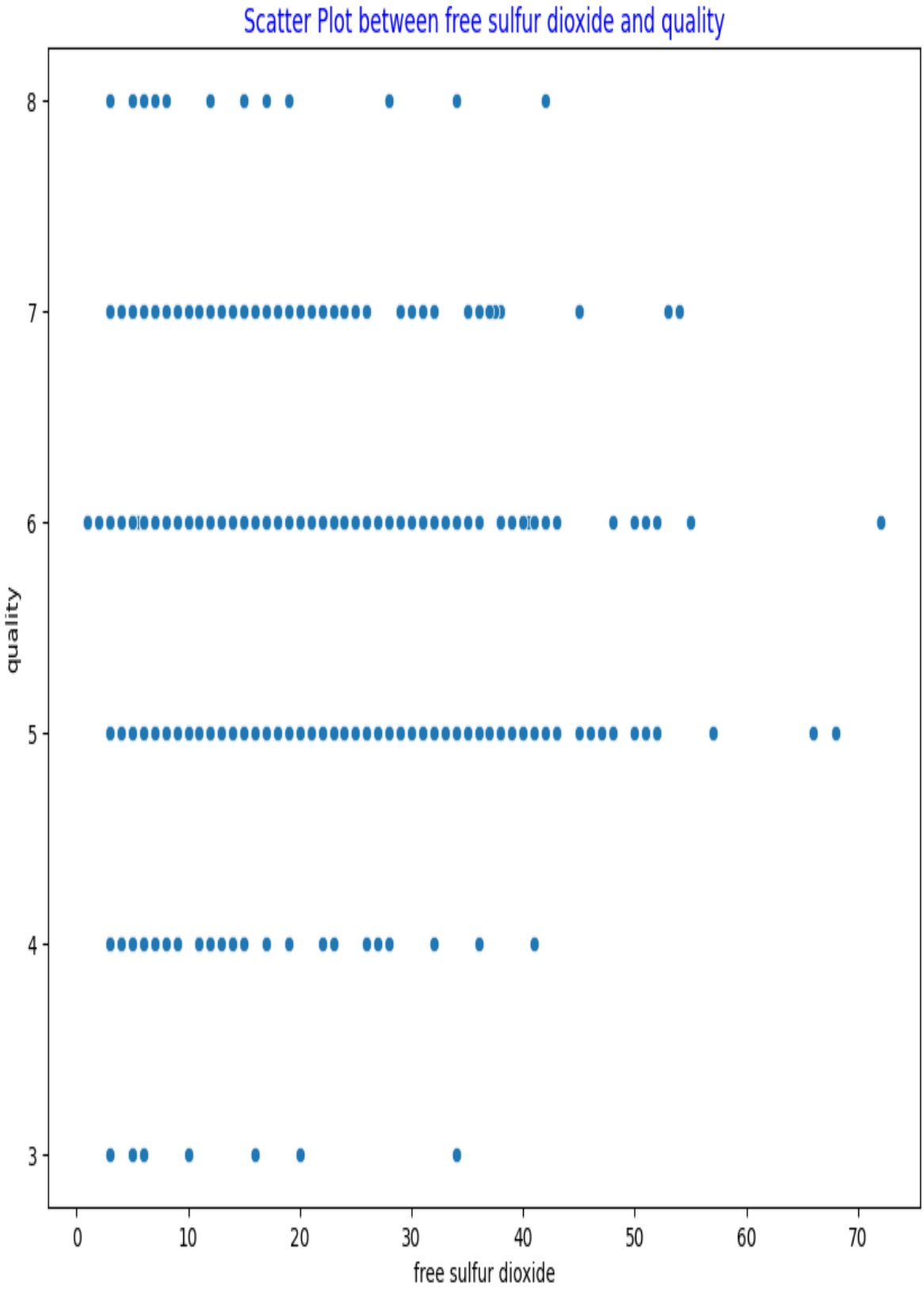

Scatter Plot between free sulfur dioxide and total sulfur dioxide
total sulfur dioxide
free sulfur dioxide
0
50
100
150
200
250
300
0
10
20
30
40
50
60
70

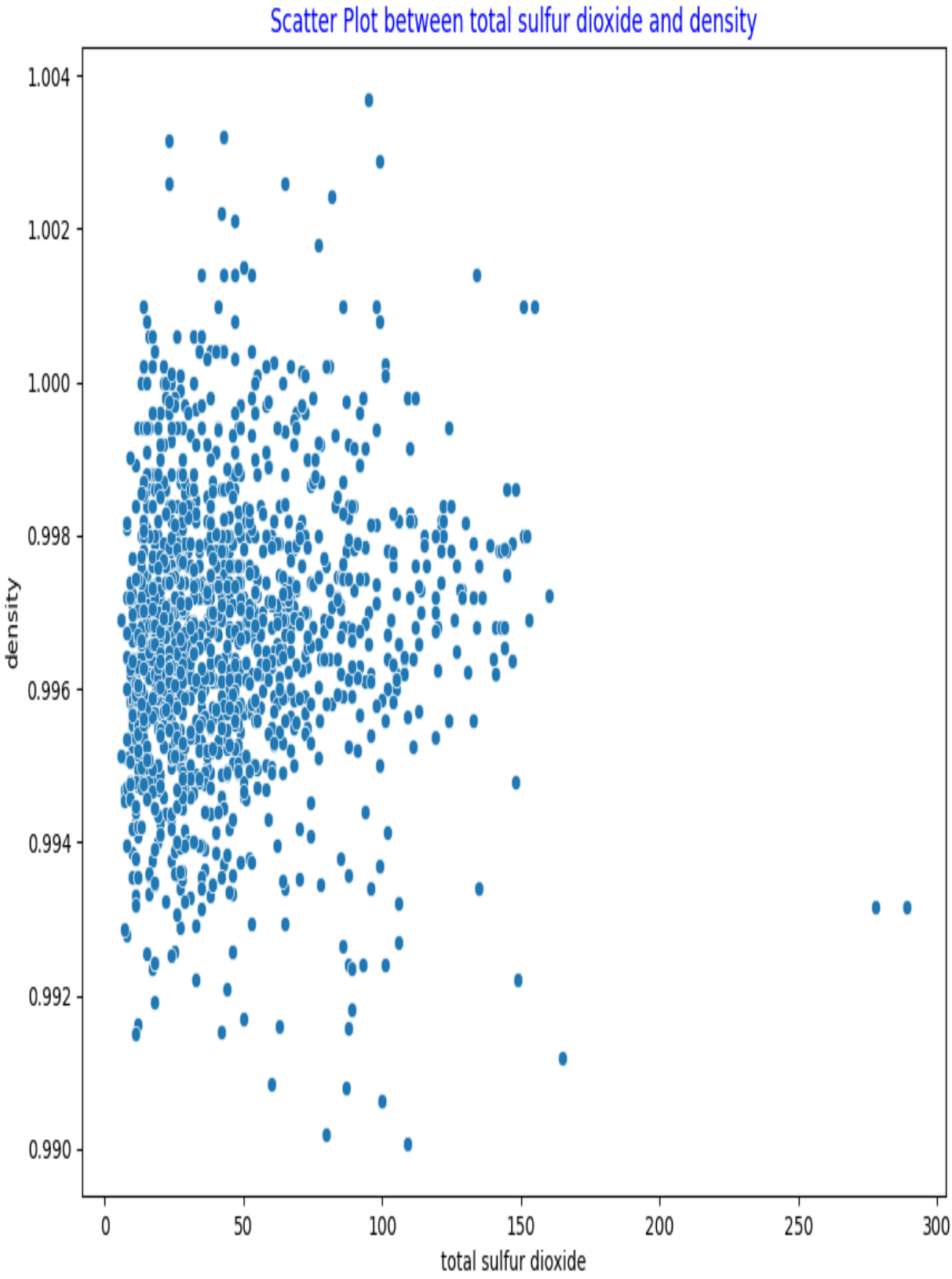

Scatter Plot between free sulfur dioxide and density
density
free sulfur dioxide
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
0
10
20
30
40
50
60
70

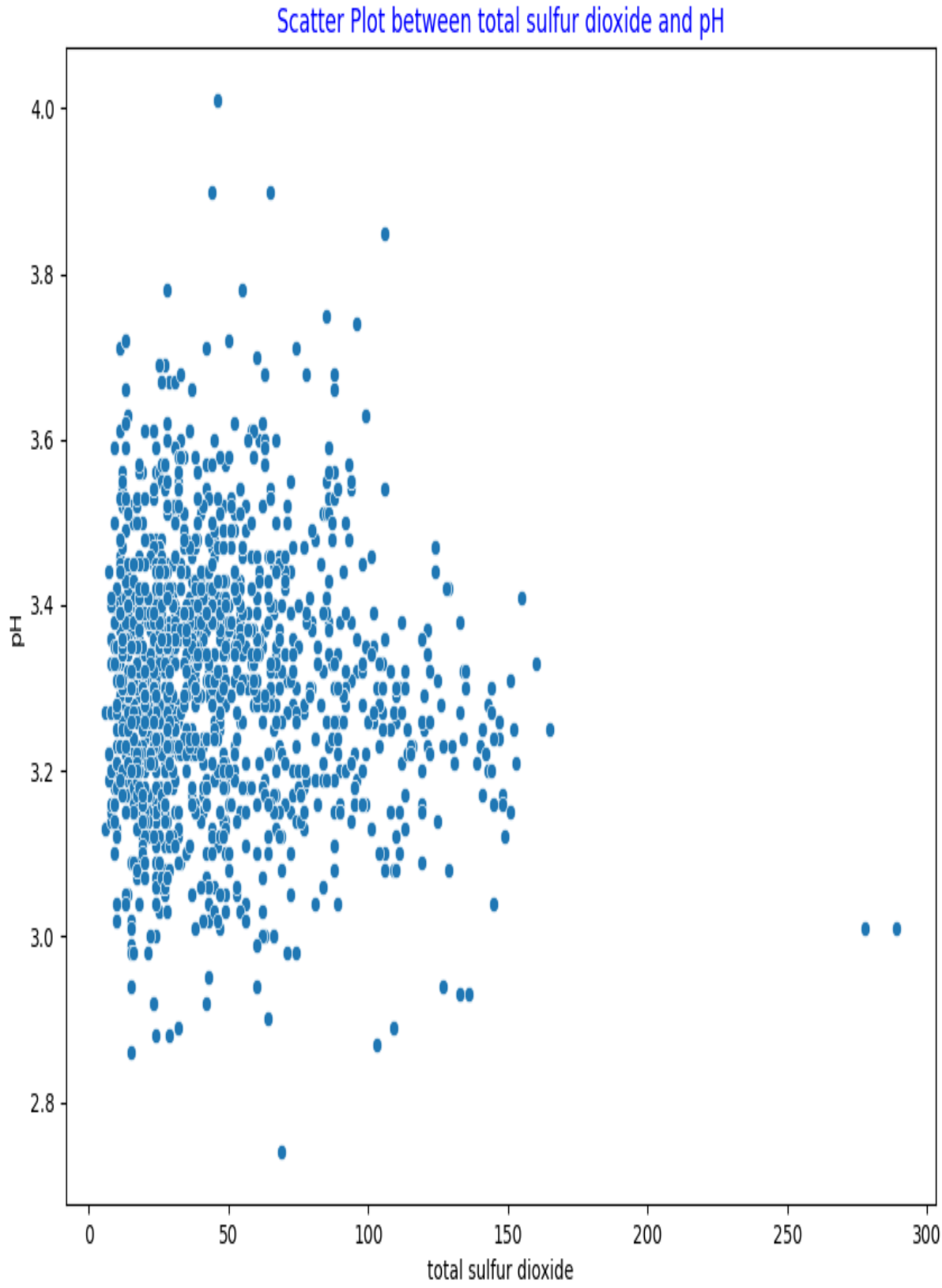

Scatter Plot between free sulfur dioxide and pH
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8
0
10
20
30
40
50
60
70
free sulfur dioxide

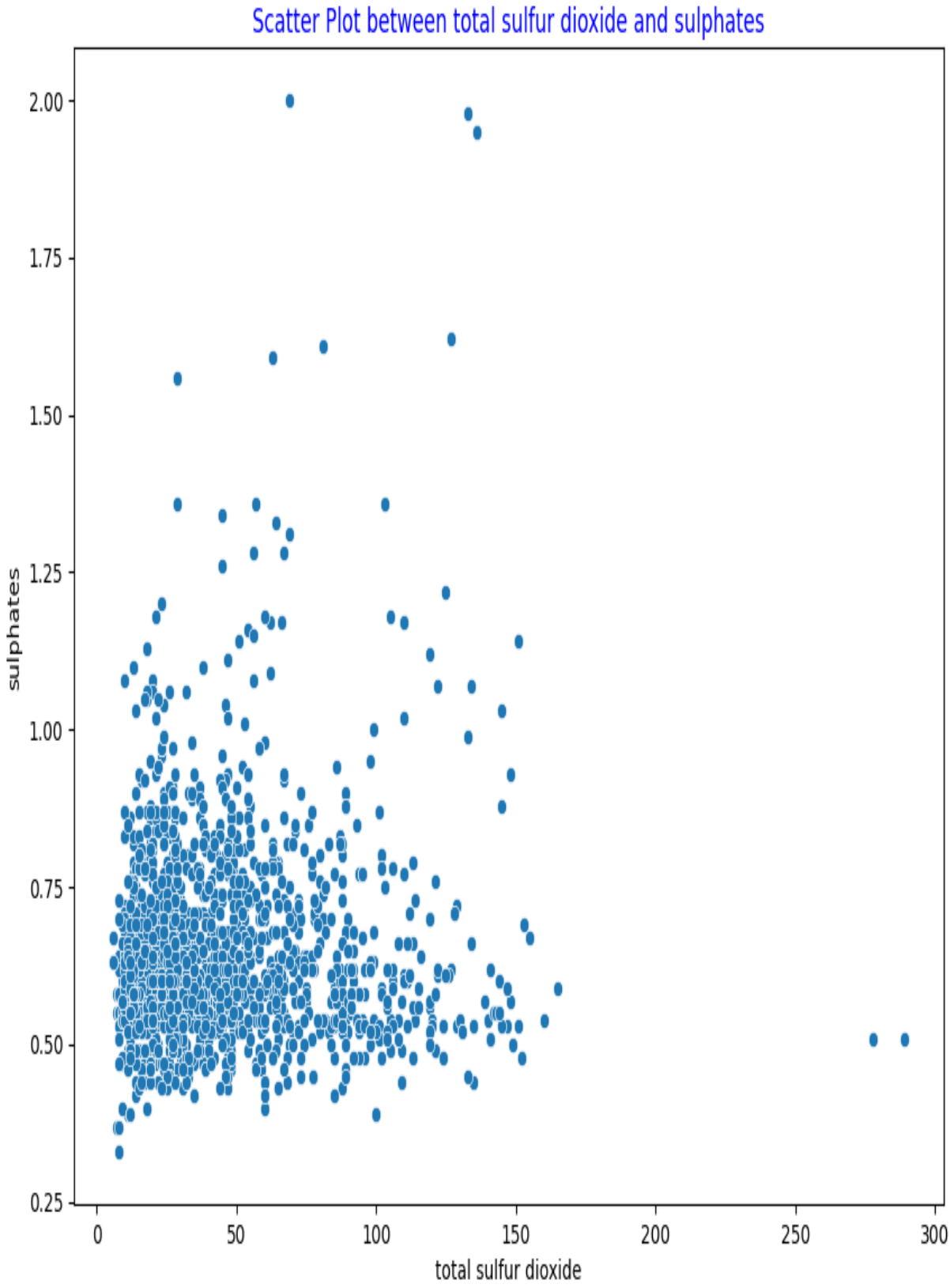

Scatter Plot between free sulfur dioxide and sulphates
sulphates
free sulfur dioxide
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0
10
20
30
40
50
60
70

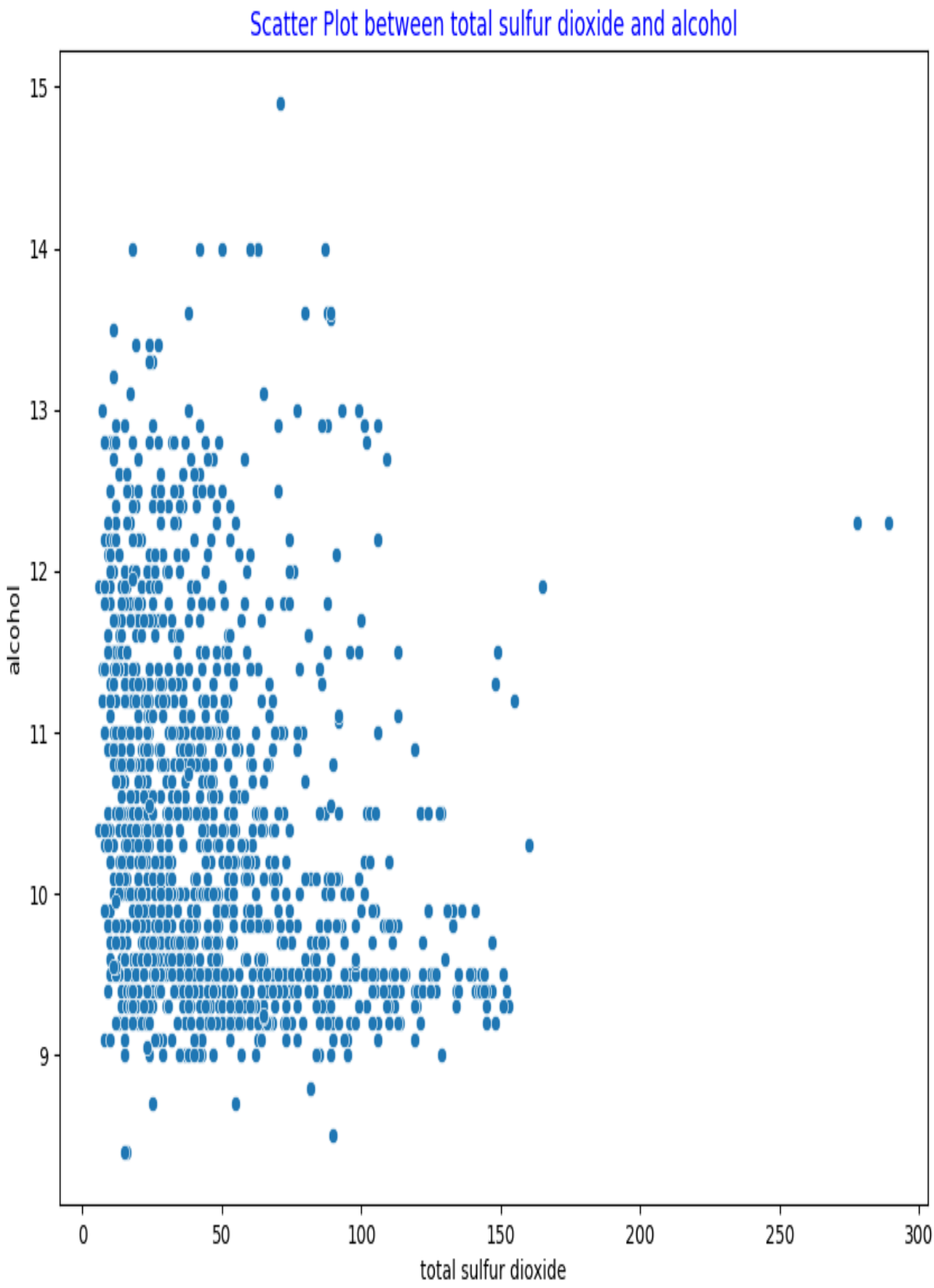

Scatter Plot between free sulfur dioxide and alcohol
alcohol
free sulfur dioxide
15
14
13
12
11
10
9
0
10
20
30
40
50
60
70

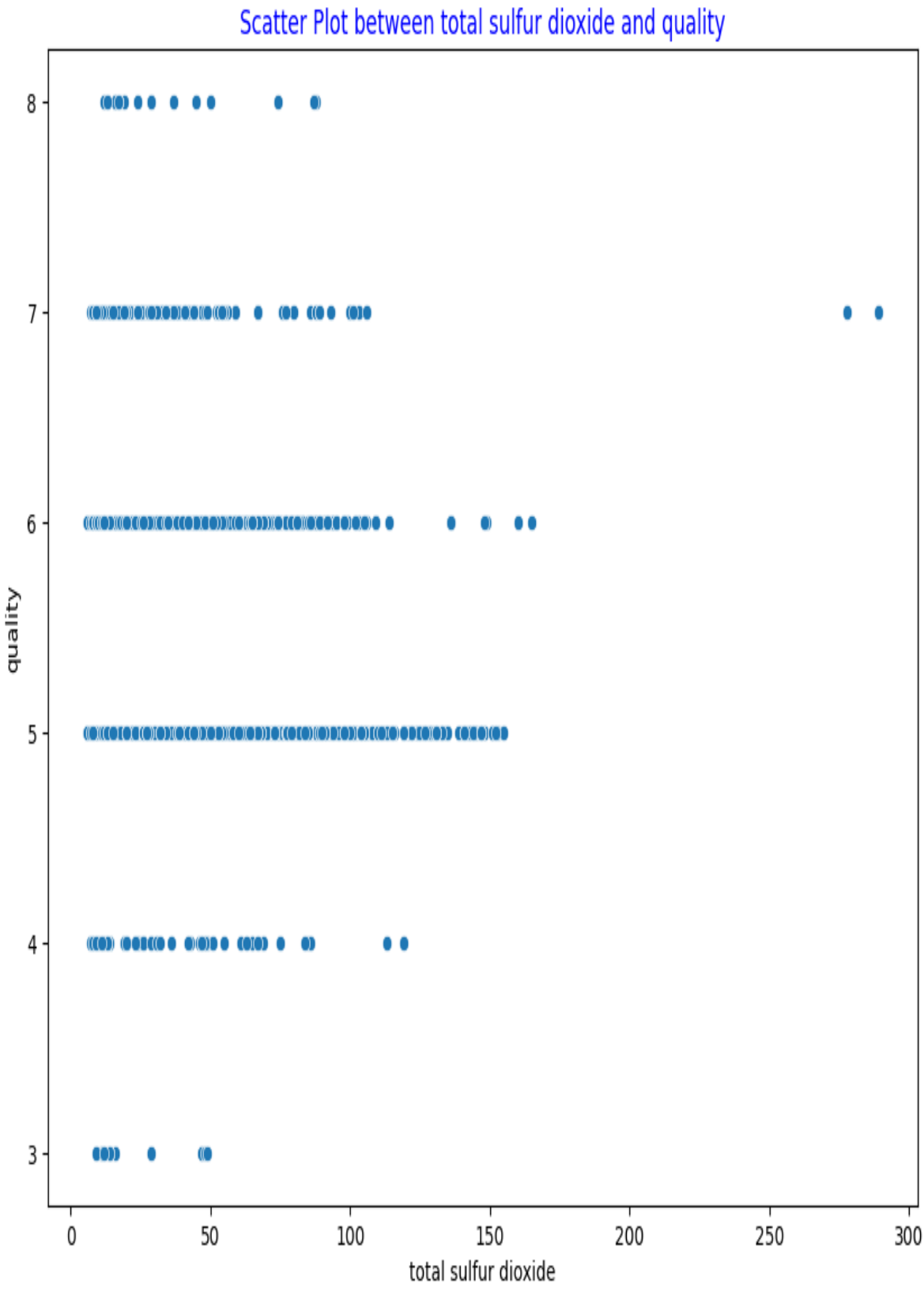

Scatter Plot between free sulfur dioxide and quality
quality
free sulfur dioxide
8
7
6
5
4
3
0
10
20
30
40
50
60
70

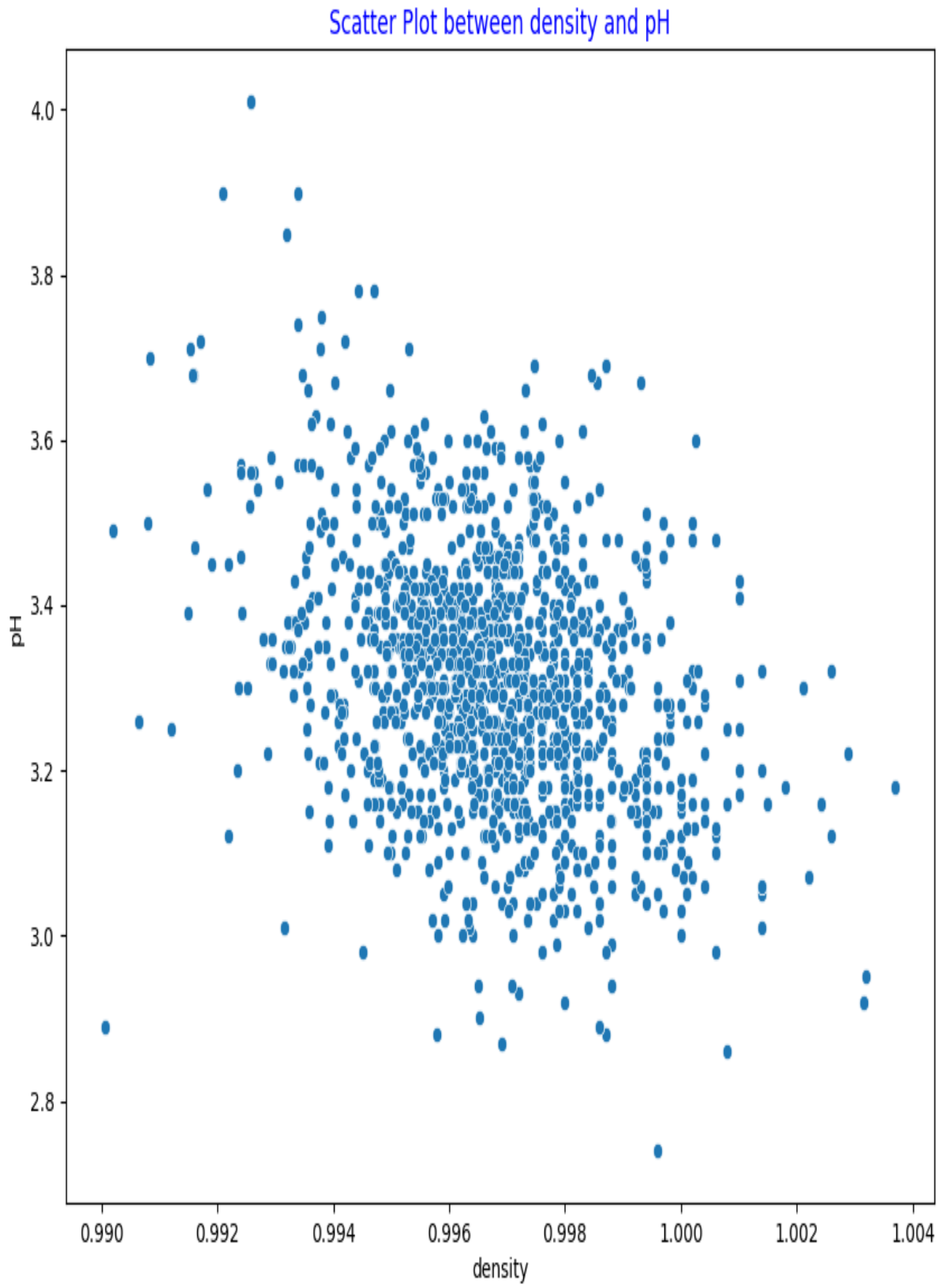

Scatter Plot between total sulfur dioxide and density
density
total sulfur dioxide
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
0
50
100
150
200
250
300

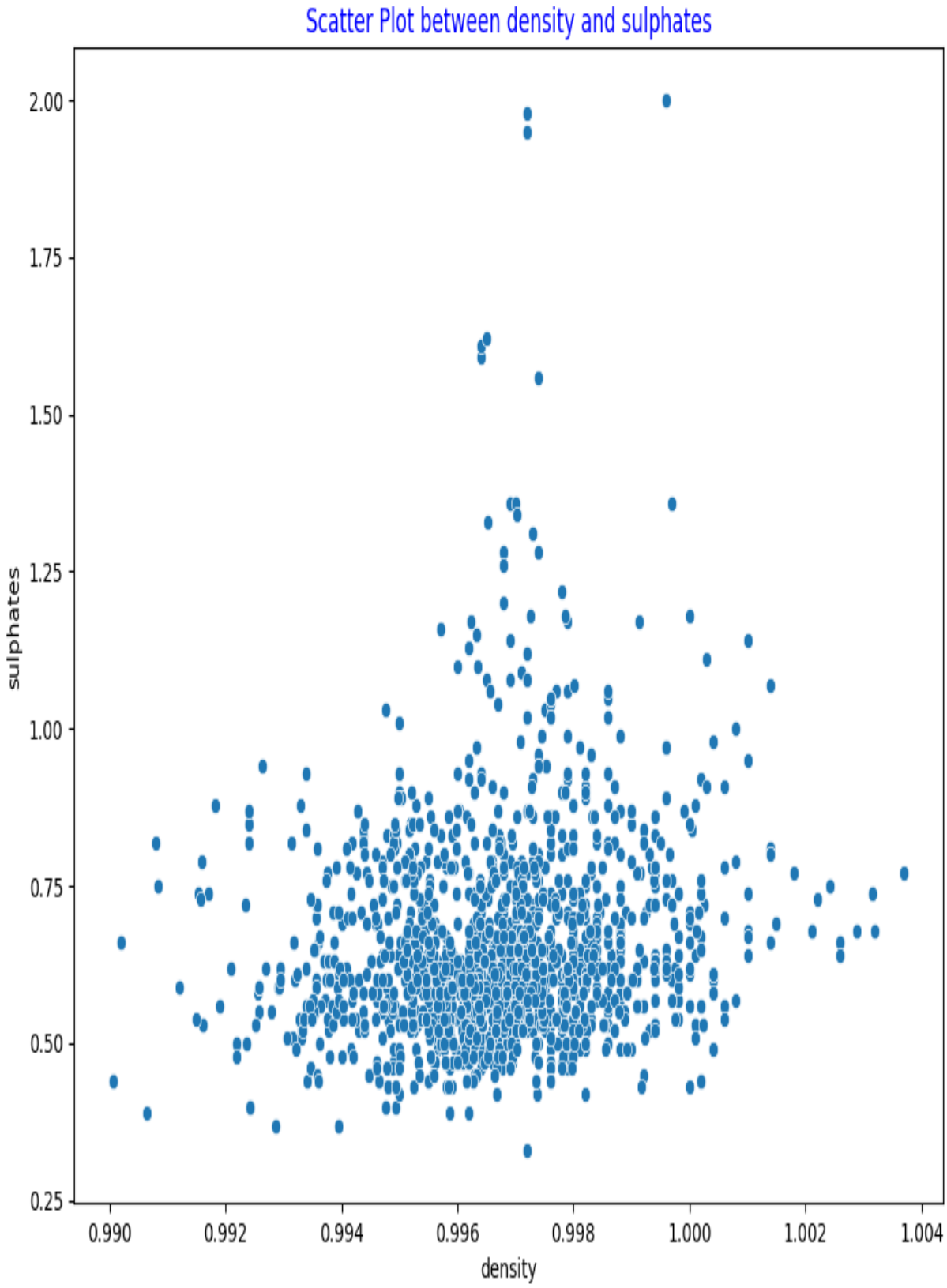

Scatter Plot between total sulfur dioxide and pH
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8
0
50
100
150
200
250
300
total sulfur dioxide

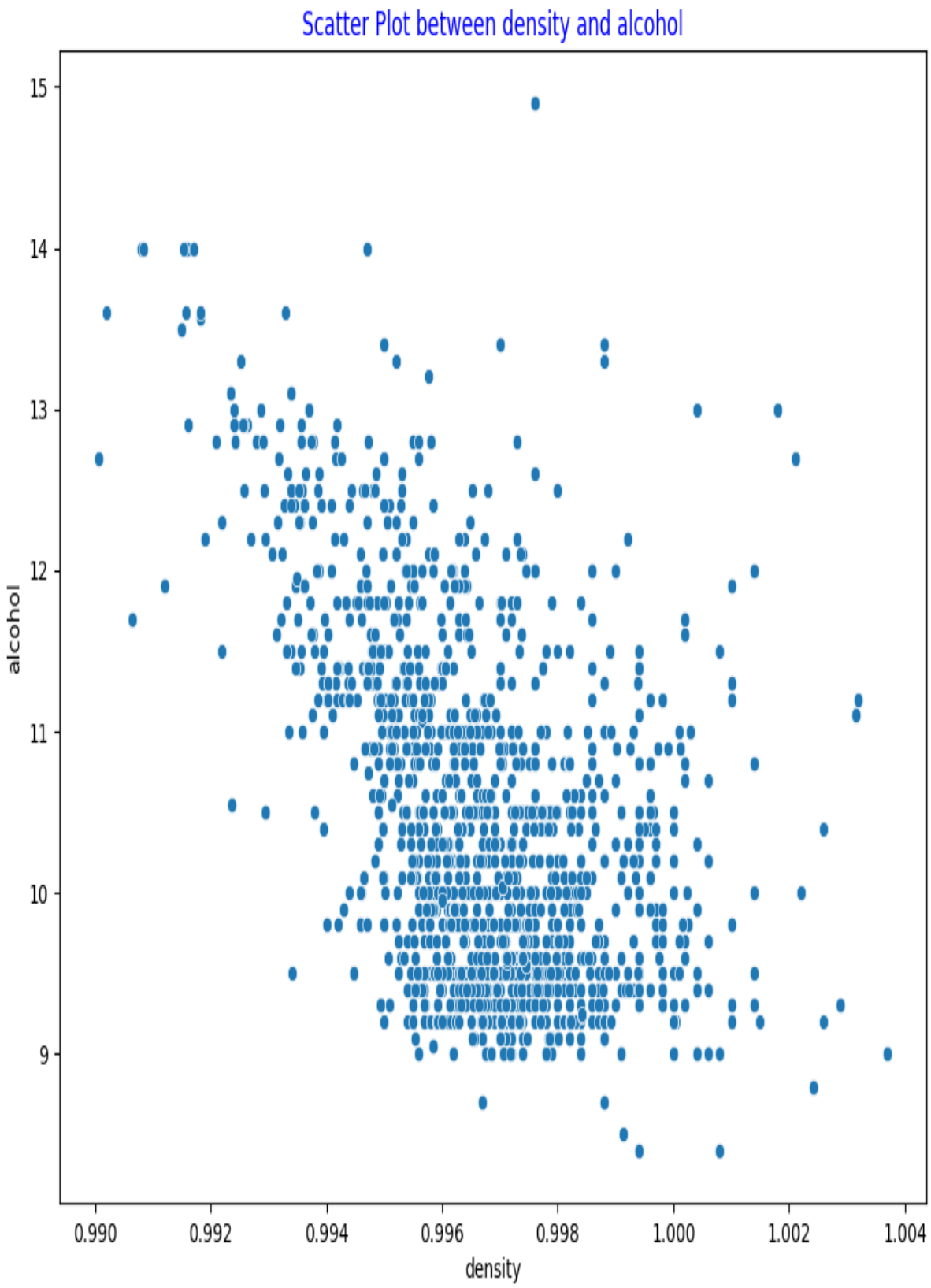

Scatter Plot between total sulfur dioxide and sulphates
sulphates
total sulfur dioxide
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0
50
100
150
200
250
300

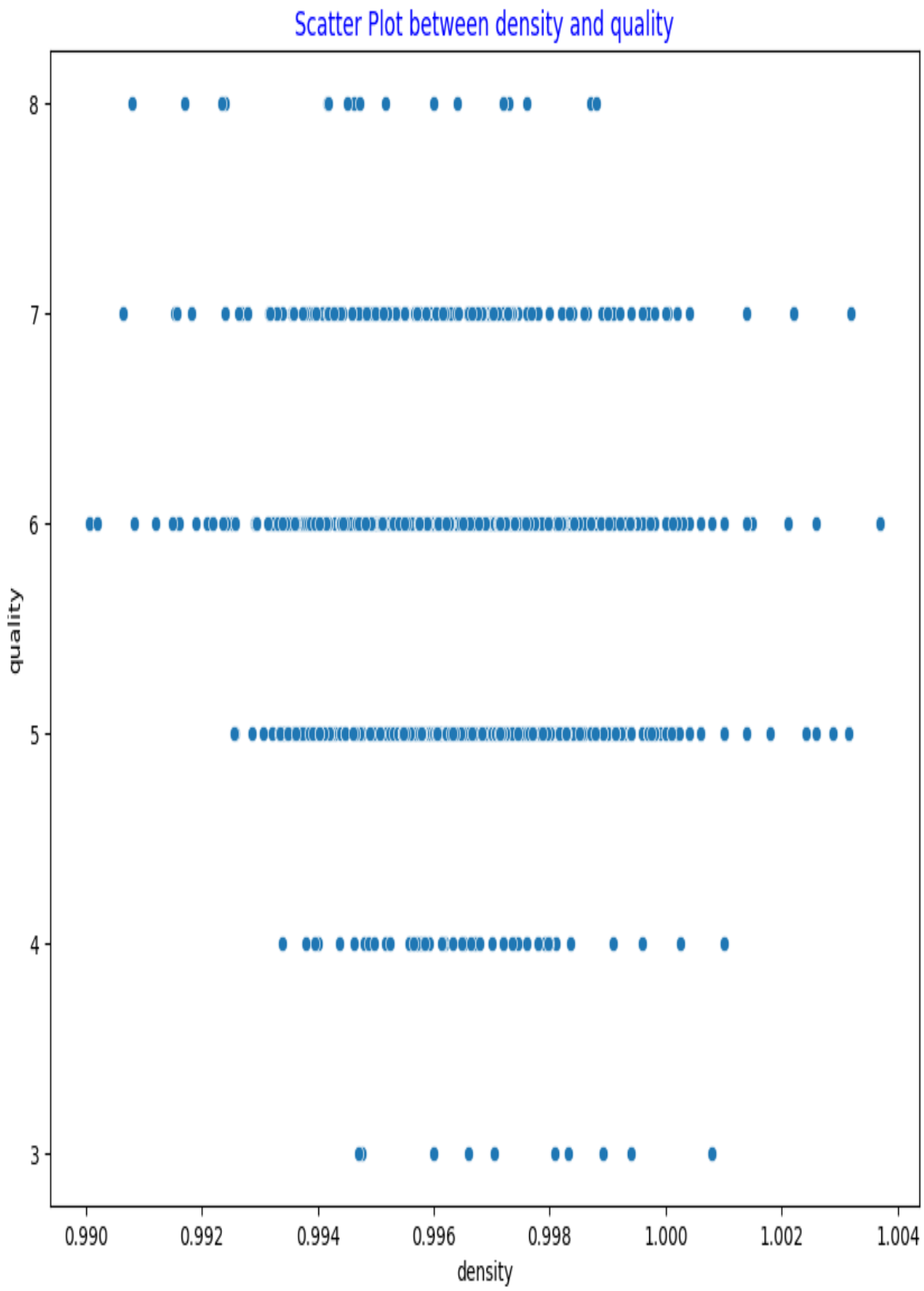

Scatter Plot between total sulfur dioxide and alcohol
alcohol
total sulfur dioxide
15
14
13
12
11
10
9
0
50
100
150
200
250
300

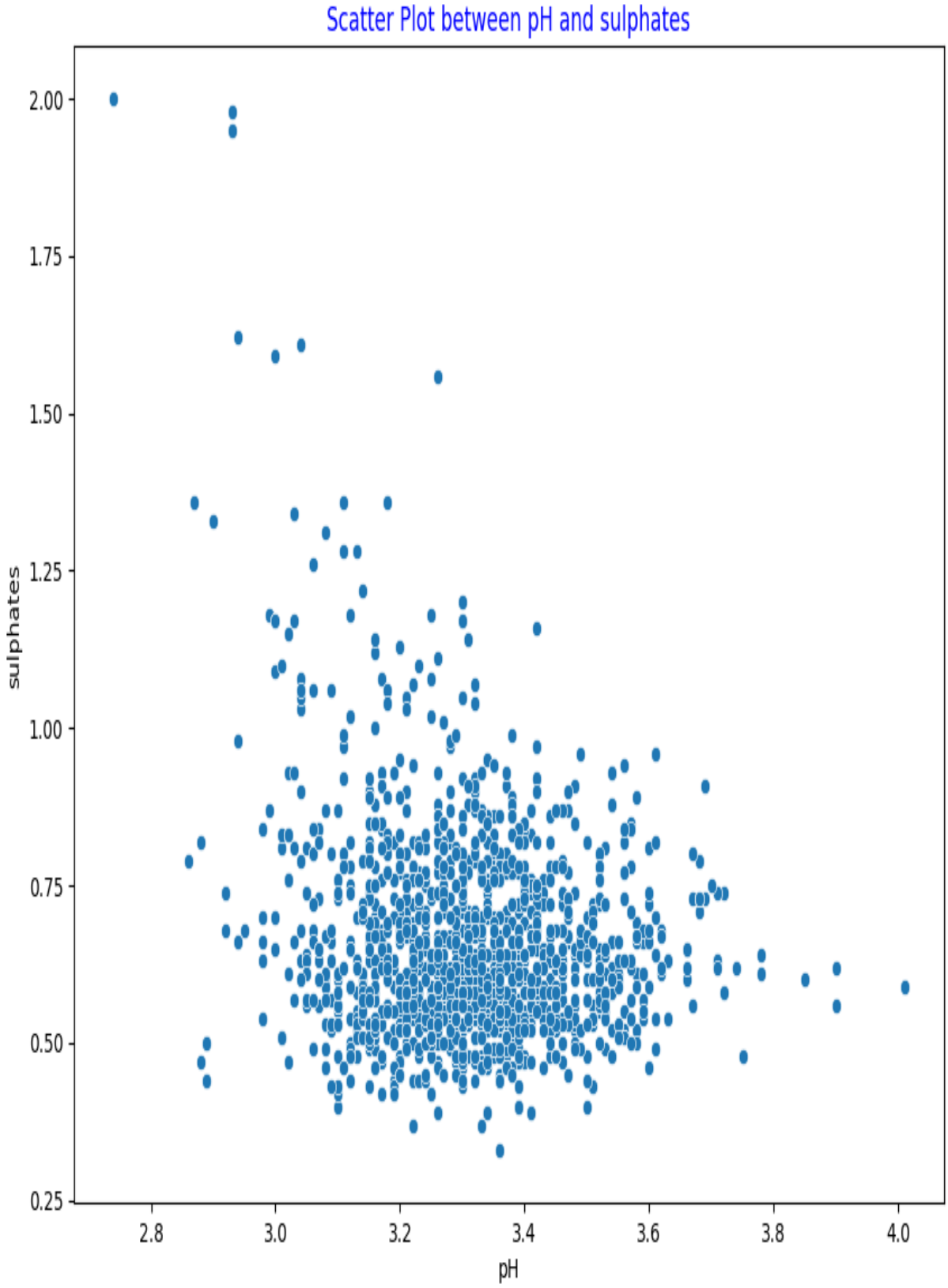

Scatter Plot between total sulfur dioxide and quality
quality
8
7
6
5
4
3
0
50
100
150
200
250
300
total sulfur dioxide

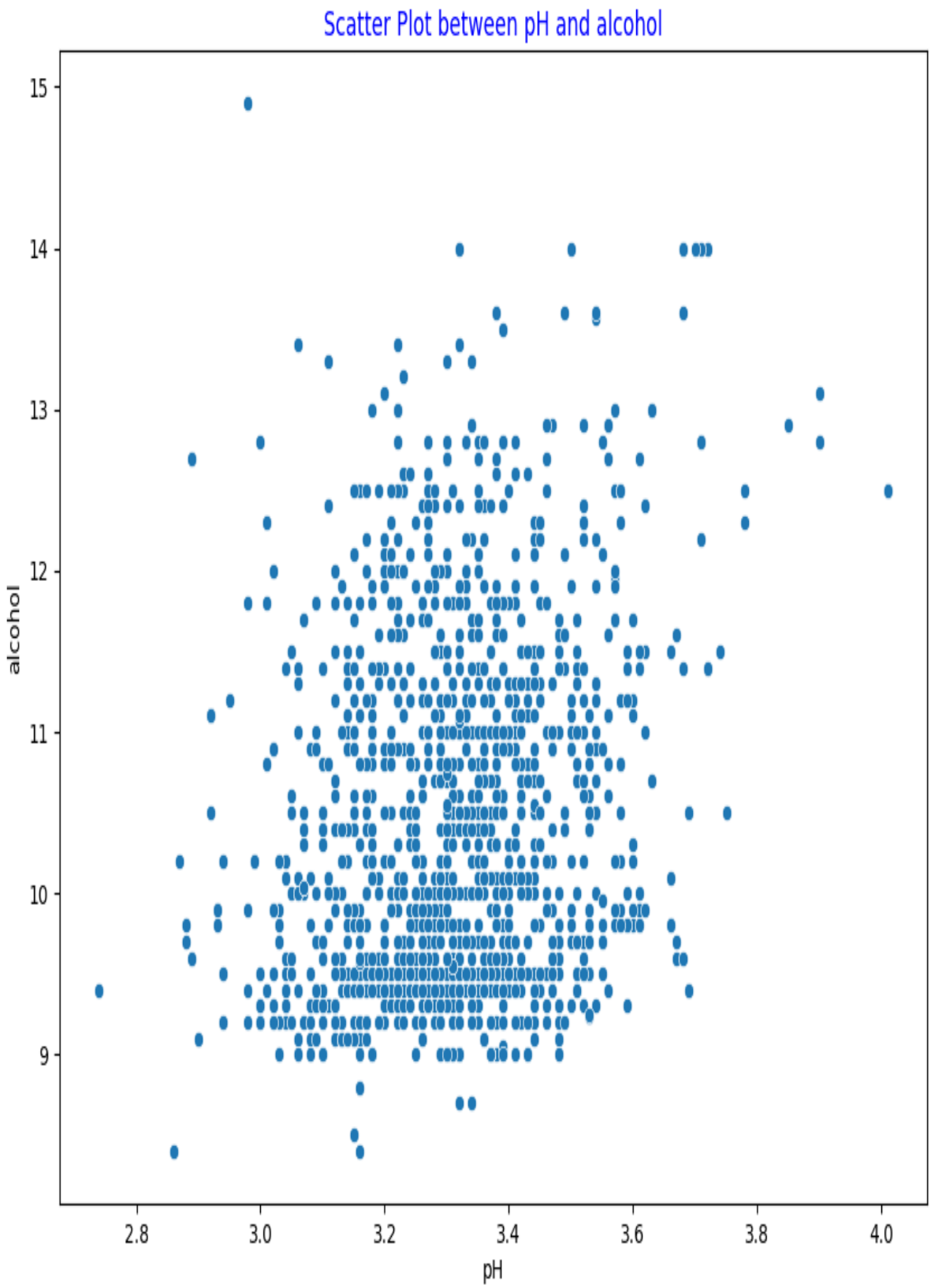

Scatter Plot between density and pH
pH
density
4.0
3.8
3.6
3.4
3.2
3.0
2.8
0.990
0.992
0.994
0.996
0.998
1.000
1.002
1.004

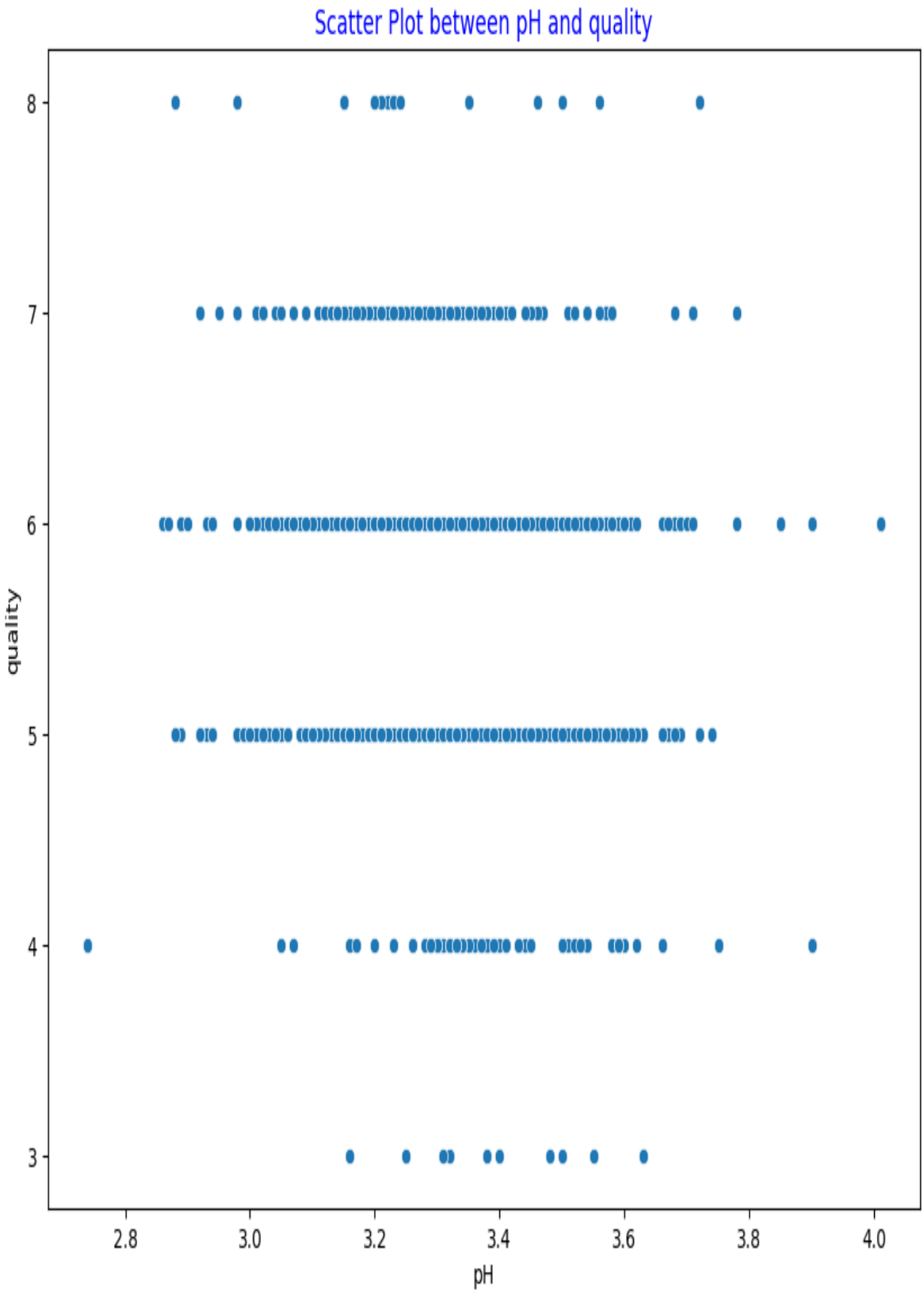

Scatter Plot between density and sulphates
sulphates
density
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.990
0.992
0.994
0.996
0.998
1.000
1.002
1.004

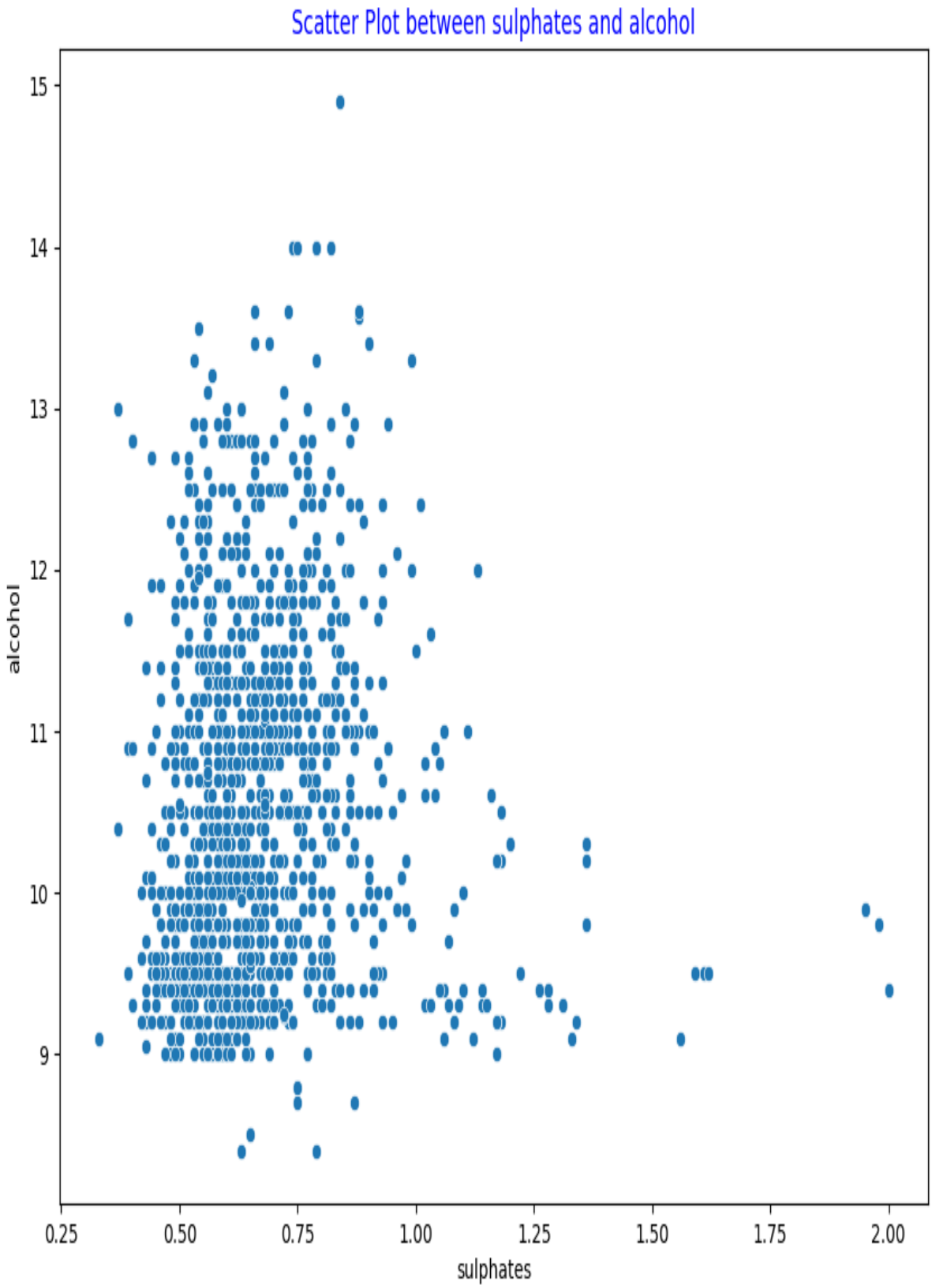

Scatter Plot between density and alcohol
alcohol
density
15
14
13
12
11
10
9
0.990
0.992
0.994
0.996
0.998
1.000
1.002
1.004

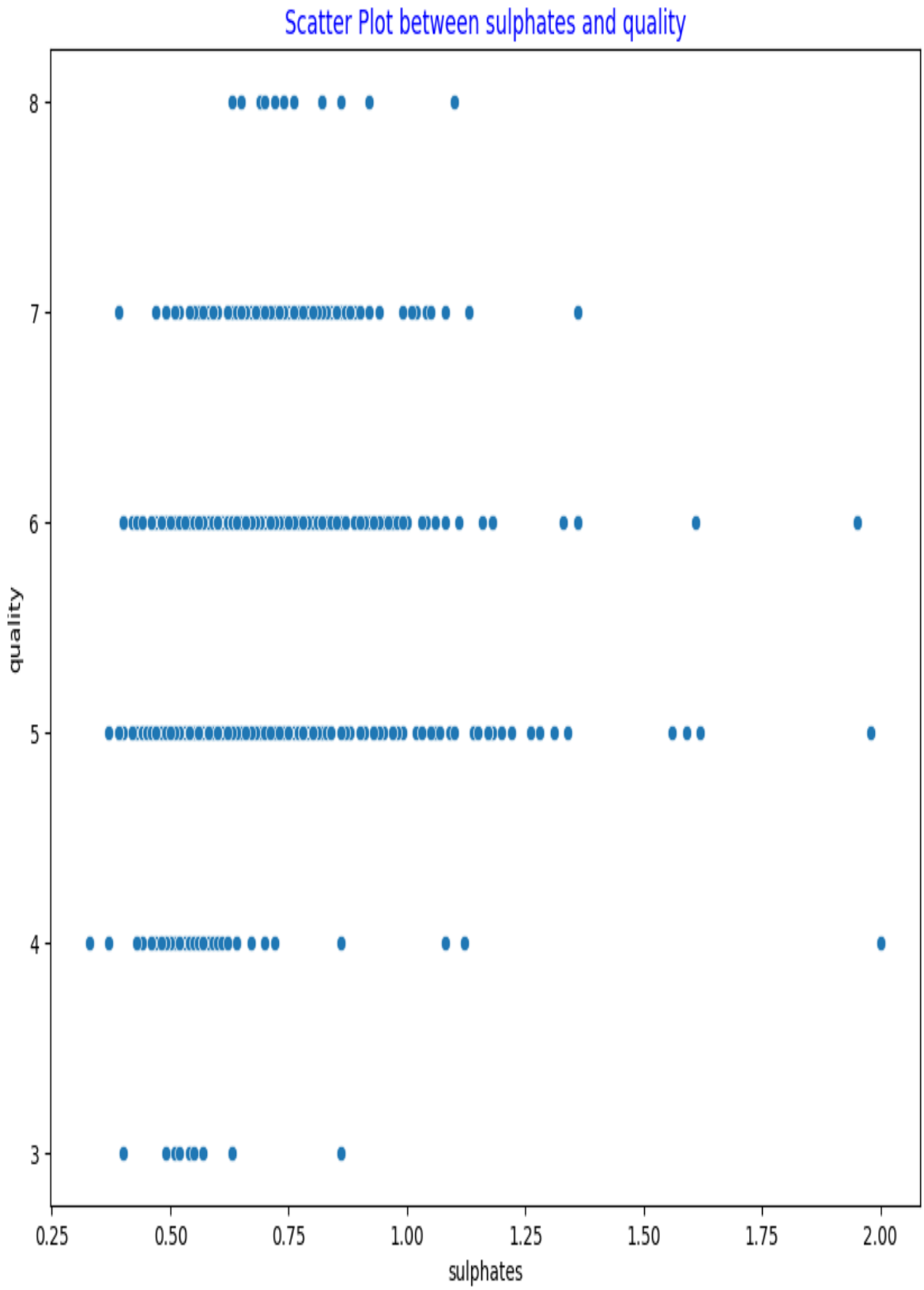

Scatter Plot between density and quality
quality
density
8
7
6
5
4
3
0.990
0.992
0.994
0.996
0.998
1.000
1.002
1.004

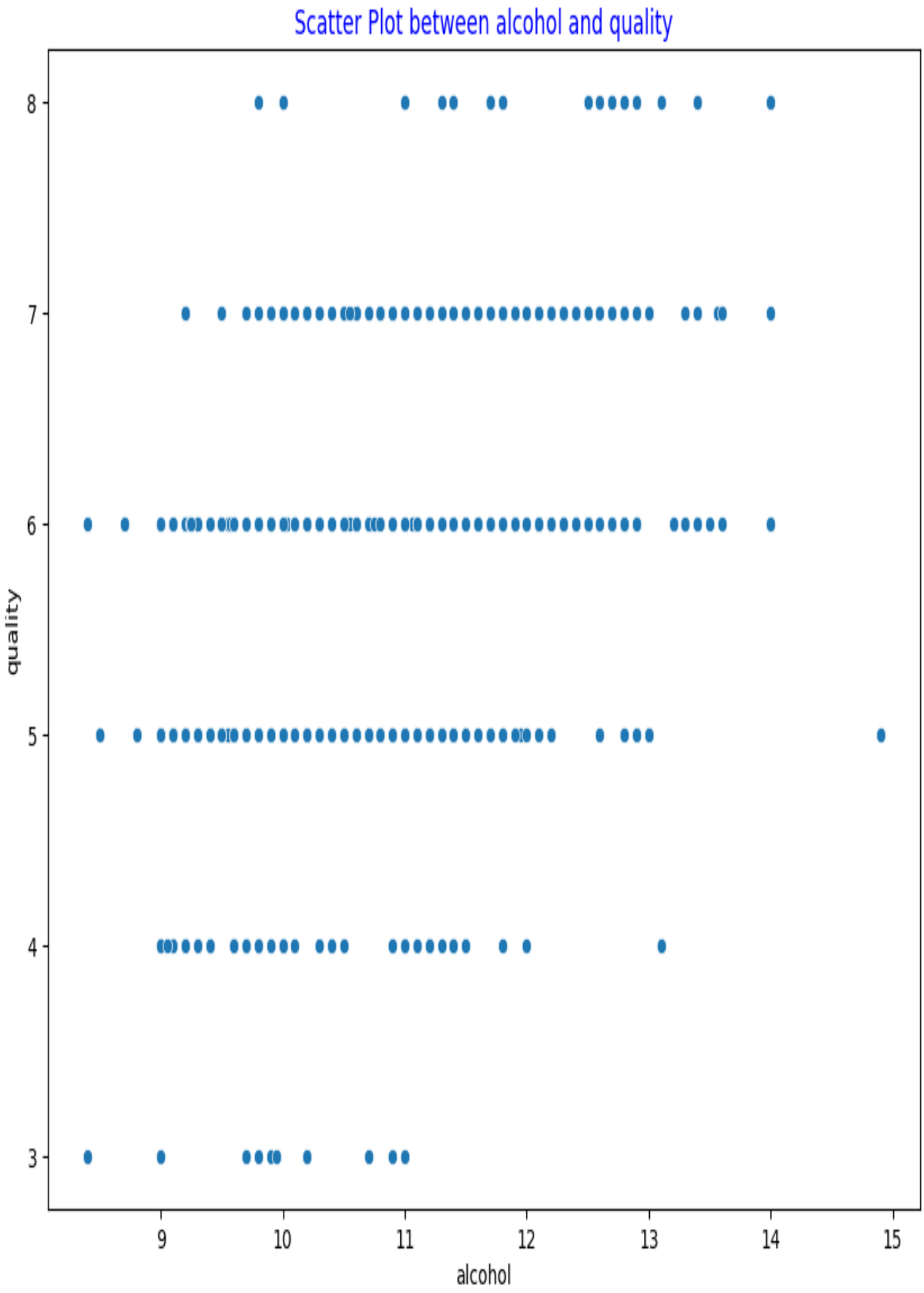

Scatter Plot between pH and sulphates
sulphates
pH
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
2.8
3.0
3.2
3.4
3.6
3.8
4.0

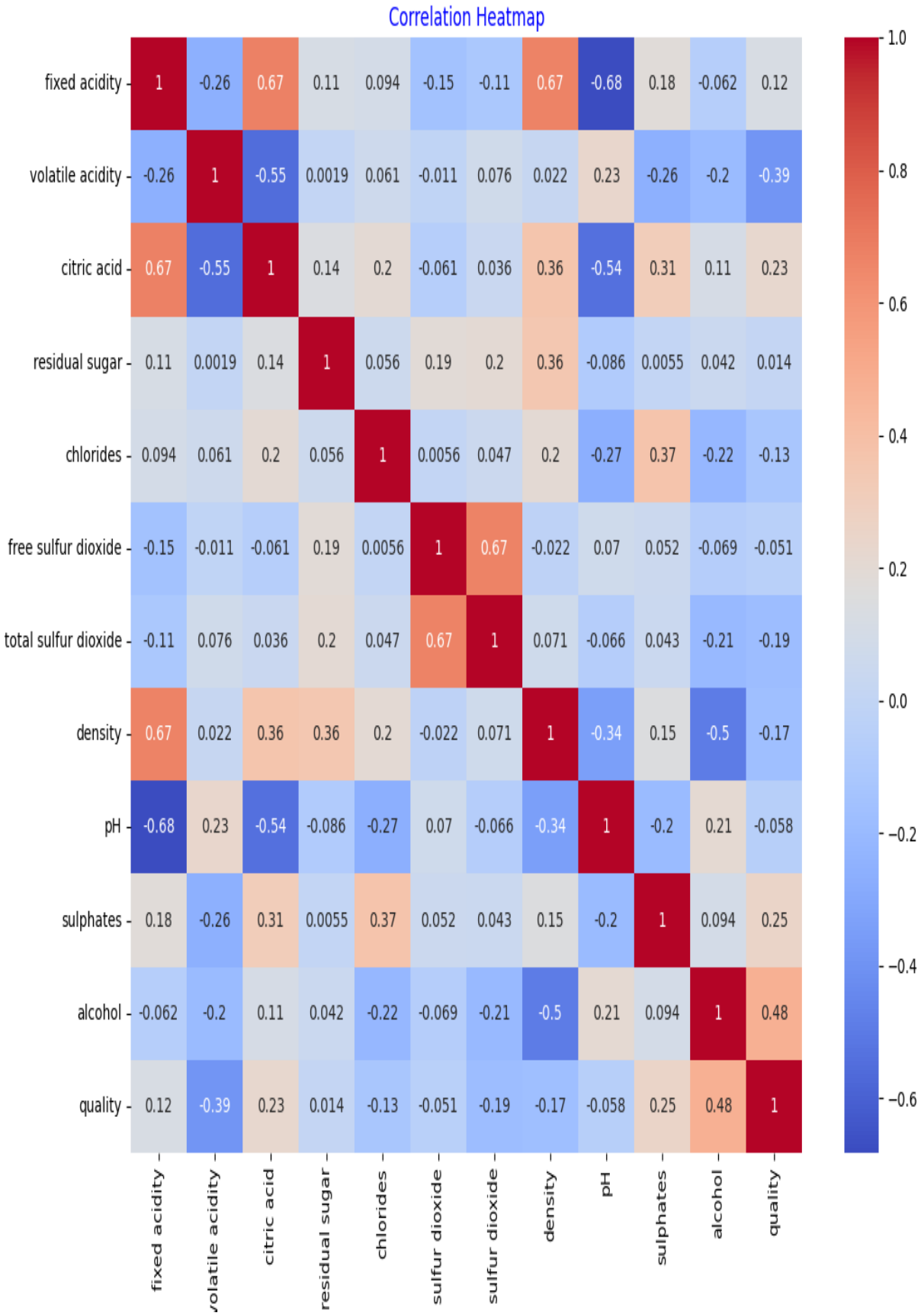

Scatter Plot between pH and alcohol
alcohol
pH
15
14
13
12
11
10
9
2.8
3.0
3.2
3.4
3.6
3.8
4.0


Scatter Plot between pH and quality
quality
pH
8
7
6
5
4
3
2.8
3.0
3.2
3.4
3.6
3.8
4.0


Scatter Plot between sulphates and alcohol
alcohol
sulphates
15
14
13
12
11
10
9
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00


Scatter Plot between sulphates and quality
quality
sulphates
8
7
6
5
4
3
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00


Scatter Plot between alcohol and quality
quality
alcohol
8
7
6
5
4
3
9
10
11
12
13
14
15


Correlation Heatmap
fixed acidity 1 -0.26 0.67 0.11 0.094 -0.15 -0.11 0.67 -0.68 0.18 -0.062 0.12
volatile acidity -0.26 1 -0.55 0.0019 0.061 -0.011 0.076 0.022 0.23 -0.26 -0.2 -0.39
citric acid 0.67 -0.55 1 0.14 0.2 -0.061 0.036 0.36 -0.54 0.31 0.11 0.23
residual sugar 0.11 0.0019 0.14 1 0.056 0.19 0.2 0.36 -0.086 0.0055 0.042 0.014
chlorides 0.094 0.061 0.2 0.056 1 0.0056 0.047 0.2 -0.27 0.37 -0.22 -0.13
free sulfur dioxide -0.15 -0.011 -0.061 0.19 0.0056 1 0.67 -0.022 0.07 0.052 -0.069 -0.051
total sulfur dioxide -0.11 0.076 0.036 0.2 0.047 0.67 1 0.071 -0.066 0.043 -0.21 -0.19
density 0.67 0.022 0.36 0.36 0.2 -0.022 0.071 1 -0.34 0.15 -0.5 -0.17
pH -0.68 0.23 -0.54 -0.086 -0.27 0.07 -0.066 -0.34 1 -0.2 0.21 -0.058
sulphates 0.18 -0.26 0.31 0.0055 0.37 0.052 0.043 0.15 -0.2 1 0.094 0.25
alcohol -0.062 -0.2 0.11 0.042 -0.22 -0.069 -0.21 -0.5 0.21 0.094 1 0.48
quality 0.12 -0.39 0.23 0.014 -0.13 -0.051 -0.19 -0.17 -0.058 0.25 0.48 1
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
sulfur dioxide
sulfur dioxide
density
pH
sulphates
alcohol
quality
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6

Summary of Insights

Dataset Overview:
- Rows: 1599, Columns: 12

Summary Statistics:

Column	Statistic	Value
fixed acidity	count	1599.0
fixed acidity	mean	8.31963727329581
fixed acidity	std	1.7410963181276953
fixed acidity	min	4.6
fixed acidity	25%	7.1
fixed acidity	50%	7.9
fixed acidity	75%	9.2
fixed acidity	max	15.9
volatile acidity	count	1599.0
volatile acidity	mean	0.5278205128205128
volatile acidity	std	0.17905970415353537
volatile acidity	min	0.12
volatile acidity	25%	0.39
volatile acidity	50%	0.52
volatile acidity	75%	0.64
volatile acidity	max	1.58
citric acid	count	1599.0
citric acid	mean	0.2709756097560976
citric acid	std	0.19480113740531857
citric acid	min	0.0
citric acid	25%	0.09
citric acid	50%	0.26
citric acid	75%	0.42
citric acid	max	1.0
residual sugar	count	1599.0
residual sugar	mean	2.53880550343965
residual sugar	std	1.4099280595072798
residual sugar	min	0.9
residual sugar	25%	1.9
residual sugar	50%	2.2
residual sugar	75%	2.6
residual sugar	max	15.5
chlorides	count	1599.0
chlorides	mean	0.08746654158849279
chlorides	std	0.0470653020100901
chlorides	min	0.012
chlorides	25%	0.07
chlorides	50%	0.079

chlorides	75%	0.09
chlorides	max	0.611
free sulfur dioxide	count	1599.0
free sulfur dioxide	mean	15.874921826141339
free sulfur dioxide	std	10.460156969809725
free sulfur dioxide	min	1.0
free sulfur dioxide	25%	7.0
free sulfur dioxide	50%	14.0
free sulfur dioxide	75%	21.0
free sulfur dioxide	max	72.0
total sulfur dioxide	count	1599.0
total sulfur dioxide	mean	46.46779237023139
total sulfur dioxide	std	32.895324478299074
total sulfur dioxide	min	6.0
total sulfur dioxide	25%	22.0
total sulfur dioxide	50%	38.0
total sulfur dioxide	75%	62.0
total sulfur dioxide	max	289.0
density	count	1599.0
density	mean	0.9967466791744841
density	std	0.0018873339538425554
density	min	0.99007
density	25%	0.9956
density	50%	0.99675
density	75%	0.997835
density	max	1.00369
pH	count	1599.0
pH	mean	3.3111131957473416
pH	std	0.15438646490354277
pH	min	2.74
pH	25%	3.21
pH	50%	3.31
pH	75%	3.4
pH	max	4.01
sulphates	count	1599.0
sulphates	mean	0.6581488430268917
sulphates	std	0.16950697959010996
sulphates	min	0.33
sulphates	25%	0.55
sulphates	50%	0.62
sulphates	75%	0.73
sulphates	max	2.0
alcohol	count	1599.0
alcohol	mean	10.422983114446529
alcohol	std	1.0656675818473946
alcohol	min	8.4

alcohol	25%	9.5
alcohol	50%	10.2
alcohol	75%	11.1
alcohol	max	14.9
quality	count	1599.0
quality	mean	5.6360225140712945
quality	std	0.807569439734705
quality	min	3.0
quality	25%	5.0
quality	50%	6.0
quality	75%	6.0
quality	max	8.0

High Correlations (|r| > 0.5):

Variable 1	Variable 2	Correlation Coefficient
fixed acidity	citric acid	0.67
fixed acidity	density	0.67
fixed acidity	pH	-0.68
volatile acidity	citric acid	-0.55
citric acid	fixed acidity	0.67
citric acid	volatile acidity	-0.55
citric acid	pH	-0.54
free sulfur dioxide	total sulfur dioxide	0.67
total sulfur dioxide	free sulfur dioxide	0.67
density	fixed acidity	0.67
pH	fixed acidity	-0.68
pH	citric acid	-0.54

Top Categorical Insights: