In [ ]:
```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
```

In [ ]:
```
df = pd.read_csv("./dirty_iris.csv").iloc[:, 1:]
df
```

Out[ ]:

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
0	5.1	3.5	1.4	0.2	Setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	NaN	3.6	1.4	0.2	setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	virginica
146	6.3	2.5	5.0	1.9	virginica
147	6.5	3.0	5.2	2.0	virginica
148	6.2	3.4	5.4	2.3	virginica
149	NaN	3.0	5.1	1.8	virginica

150 rows × 5 columns

In [ ]:
```
# i
n = len(df)
summary = df.notnull().all(axis=1).value_counts()
complete_rows = summary[True]
print(f"Complete rows : {complete_rows}")
print(f"Percent of complete rows: {complete_rows/n * 100 : .3f}%")
```

```
Complete rows : 131
Percent of complete rows:  87.333%
```

In [ ]:
```
# ii
NA = np.nan
df.fillna(NA, inplace=True)
df
```

Out[ ]:

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
0	5.1	3.5	1.4	0.2	Setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	NaN	3.6	1.4	0.2	setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	virginica
146	6.3	2.5	5.0	1.9	virginica
147	6.5	3.0	5.2	2.0	virginica
148	6.2	3.4	5.4	2.3	virginica
149	NaN	3.0	5.1	1.8	virginica

150 rows × 5 columns

In [ ]:

```
#  iii
rules = [
    df["Species"].isin(["setosa", "versicolor", "virginica"]) ,
    ((df["Sepal.Length"] >= 0) & (df["Sepal.Width"] >= 0) & (df["Petal.Length"] >=
    (df["Petal.Length"] >= 2*df["Petal.Width"]) ,
    (df["Sepal.Length"] <= 30) ,
    (df["Sepal.Length"] >  df["Petal.Length"])
]
rules
```

Out[ ]:
```
[0      False
 1       True
 2       True
 3       True
 4       True
        ...
 145     True
 146     True
 147     True
 148     True
 149     True
 Name: Species, Length: 150, dtype: bool,
 0       True
 1       True
 2       True
 3       True
 4      False
        ...
 145     True
 146     True
 147     True
 148     True
 149    False
 Length: 150, dtype: bool,
 0      True
 1      True
 2      True
 3      True
 4      True
        ...
 145    True
 146    True
 147    True
 148    True
 149    True
 Length: 150, dtype: bool,
 0       True
 1       True
 2       True
 3       True
 4      False
        ...
 145     True
 146     True
 147     True
 148     True
 149    False
 Name: Sepal.Length, Length: 150, dtype: bool,
 0       True
 1       True
 2       True
 3       True
 4      False
        ...
 145     True
 146     True
```

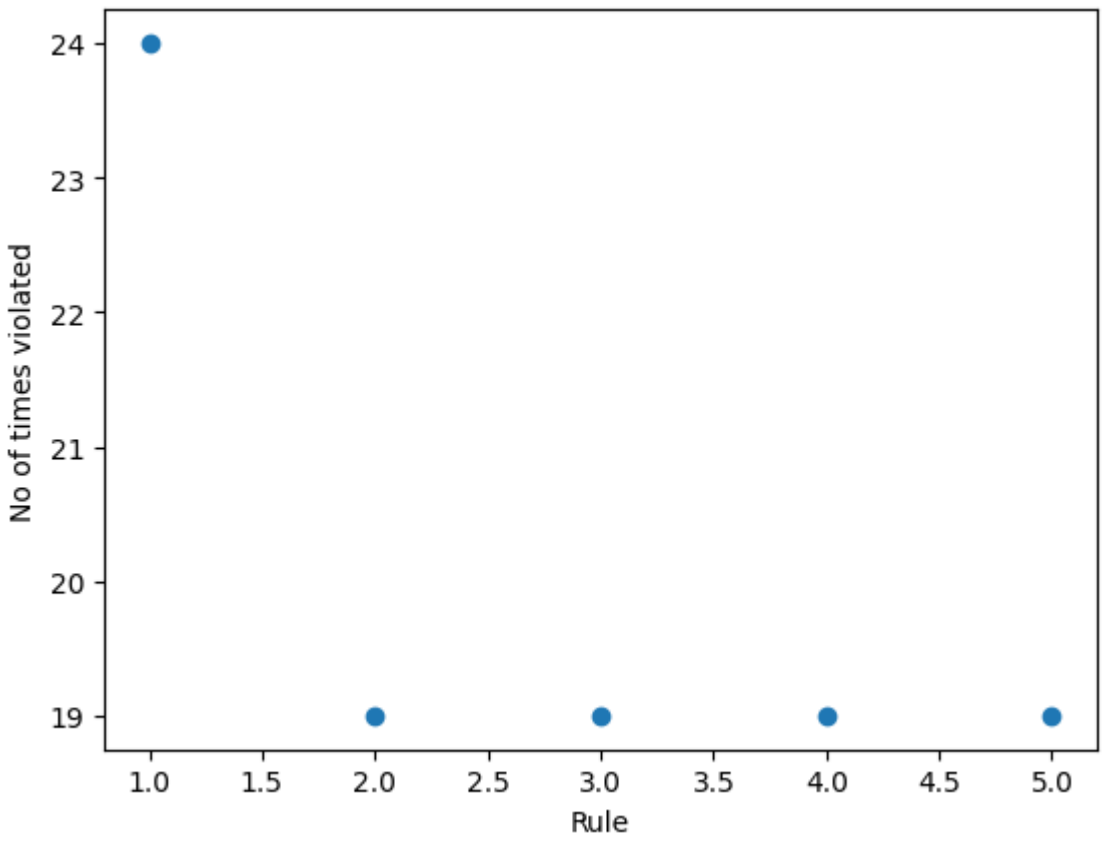
```
147     True
148     True
149    False
Length: 150, dtype: bool]
```

In [ ]:
```
# vi)
rule_break = []
for i,rule in enumerate(rules):
    print(f"Rule : {i+1}")
    summary = df[rule].value_counts()
    count = len(summary)
    rule_break.append(n-count)
    print(f"Violated {n - count} times")

plt.scatter(np.arange(1,len(rule_break)+1), rule_break)
plt.xlabel("Rule")
plt.ylabel("No of times violated")
```

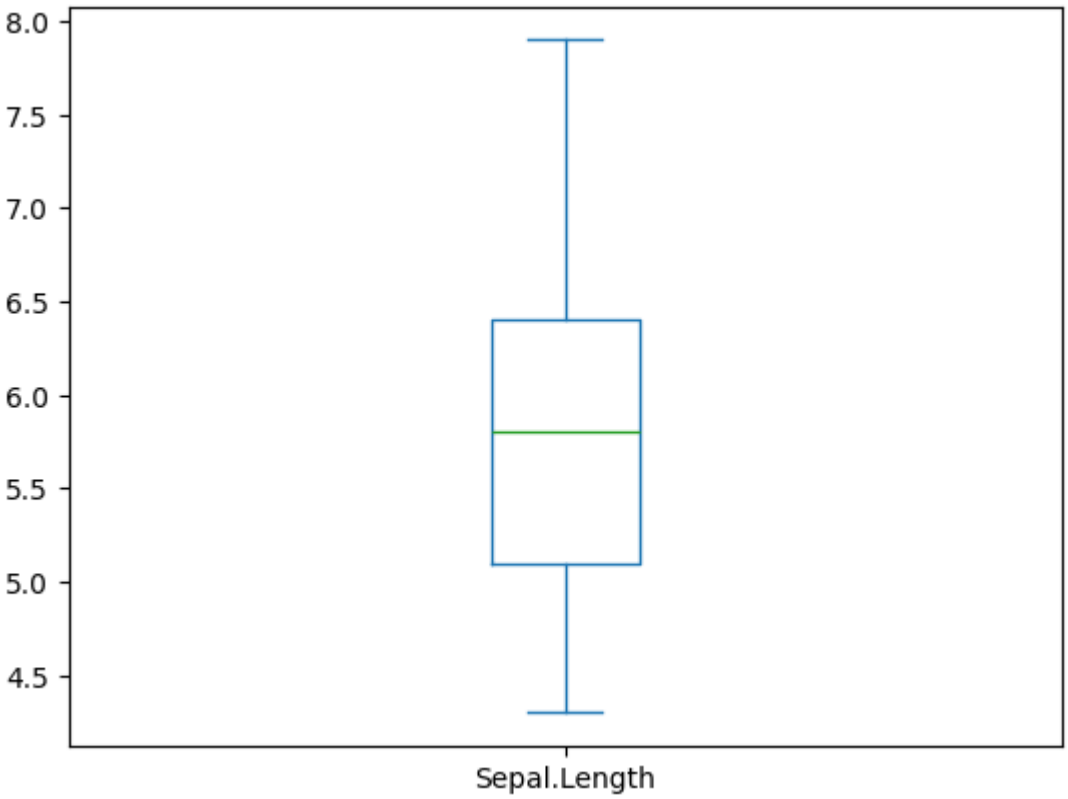
```
Rule : 1
Violated 24 times
Rule : 2
Violated 19 times
Rule : 3
Violated 19 times
Rule : 4
Violated 19 times
Rule : 5
Violated 19 times
```

Out[ ]: Text(0, 0.5, 'No of times violated')



In [ ]:
```
# v)
df["Sepal.Length"].plot.box()
# as such no outliers
```

Out[ ]: <Axes: >



In [ ]: