In [1]:
```
import pandas as pd
```

Pandas Series

In [3]:
```
obj = pd.Series([4, 7, -5, 3])
```

In [4]:
```
obj[obj%2==0]
```

Out[4]:
```
0    4
dtype: int64
```

In [5]:
```
obj+5
```

Out[5]:
```
0     9
1    12
2     0
3     8
dtype: int64
```

In [6]:
```
obj * 2
```

Out[6]:
```
0     8
1    14
2   -10
3     6
dtype: int64
```

In [7]:
```
sdata = {'Ohio': 35000, 'Texas': 71000, 'Oregon': 16000,
'Utah': 5000}
obj3 = pd.Series(sdata)
print(obj3)
```

```
Ohio      35000
Texas     71000
Oregon    16000
Utah       5000
dtype: int64
```

Pandas DataFrame

Constructing Pandas DataFrame:

1. From List

In [8]:
```
list1 = [['Alice',23,3.5,10],['Bob',24,3.4,6],['Charlie',22,3.9,8]]
df = pd.DataFrame(list1)
df.columns = ['name','age','cgpa','hoursStudied']
print(df.head())
```

```
      name  age  cgpa  hoursStudied
0    Alice   23   3.5            10
1      Bob   24   3.4             6
2  Charlie   22   3.9             8
```

2. From Dictionary

In [9]:
```
dict1 = {'id':[1,2,3],'name':['alice','bob','charlie'],
'age':[20, 25, 32]}
df1 = pd.DataFrame(dict1)
print(df1)
```

```
   id     name  age
0   1    alice   20
1   2      bob   25
2   3  charlie   32
```

3. From CSV File

In [12]:
```
df2 = pd.read_csv('sample_data_1.csv', header = None)
df2.columns=['id','state','population','murder_rate']
print(df2)
df2.head()
df2.tail()
df2.count()
```

```
   id        state  population  murder_rate
0   1      Alabama     4779736          5.7
1   2       Alaska      710231          5.6
2   3      Arizona     6392017          4.7
3   4     Arkansas     2915918          5.6
4   5   California    37253956          4.4
5   6     Colorado     5029196          2.8
6   7  Connecticut     3574097          2.4
7   8     Delaware      897934          5.8
```

Out[12]:
```
id             8
state          8
population     8
murder_rate    8
dtype: int64
```

4. Select, Add, Delete, Rename Indices, Rows or Columns of/from a DataFrame

In [13]:
```
#Seleting the first cell
print(df1.iloc[0][0])
print(df1.loc[0]['name'])
```

```
1
alice
```

In [16]:
```
#Selecting a few columns
df3=df[['name','cgpa']]
print(df3)
```

```
      name  cgpa
0    Alice   3.5
1      Bob   3.4
2  Charlie   3.9
```

In [17]:
```
#Selecting a few rows
df4 = df1.loc[1:2]
print(df4)
df5 = df1.iloc[1:3]
print(df5)
```

```
   id     name  age
1   2      bob   25
2   3  charlie   32
   id     name  age
1   2      bob   25
2   3  charlie   32
```

In [18]:
```
#Selecting a few rows and columns
df4 = df1.loc[1:2,['name','age']]
print(df4)
df5 = df1.iloc[1:3,[0,1]]
print(df5)
```

```
      name  age
1      bob   25
2  charlie   32
   id     name
1   2      bob
2   3  charlie
```

In [19]:
```
#Appending two dataframes
list1 = [['Alice',23,3.5,10],['Bob',24,3.4,6],['Charlie',22,3.9,8]]
df = pd.DataFrame(list1)
df.columns = ['name','age','cgpa','hoursStudied']
list2 = [['Don',21,2.5,2],['Elton',25,2.75,4]]
df11 = pd.DataFrame(list2)
df11.columns = ['name','age','cgpa','hoursStudied']
df12 = df.append(df11, ignore_index=True)
print(df12)
```

```
      name  age  cgpa  hoursStudied
0    Alice   23  3.50            10
1      Bob   24  3.40             6
2  Charlie   22  3.90             8
3      Don   21  2.50             2
4    Elton   25  2.75             4
```

In [24]:
```
#Renaming columns
new_cols = ['n','a','hs']
df12.columns=new_cols
print(df12)
```

```
         n   a  hs
2  Charlie  22   8
3      Don  21   2
4    Elton  25   4
```

5. Data Filtering, Sorting

In [26]:
```
cgpa_greater_than_three_point_five1 = df[df['cgpa'] > 3.5]
cgpa_greater_than_three_point_five2 = df.loc[df['cgpa'] > 3.5]
cgpa_greater_than_three_point_five3 = df.query('cgpa > 3.5')
print(cgpa_greater_than_three_point_five1)
print(cgpa_greater_than_three_point_five2)
print(cgpa_greater_than_three_point_five3)
df1.sort_values(by='age',ascending=False)
```

```
      name  age  cgpa  hoursStudied
2  Charlie   22   3.9             8
      name  age  cgpa  hoursStudied
2  Charlie   22   3.9             8
      name  age  cgpa  hoursStudied
2  Charlie   22   3.9             8
```

Out[26]:

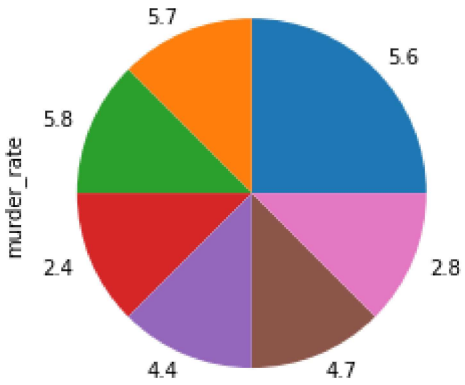
	id	name	age
2	3	charlie	32
1	2	bob	25
0	1	alice	20

In [27]:
```
murder_rate = df2[['murder_rate']]
print("Mean: " ,murder_rate.mean())
print("Standard Deviation: ",murder_rate.std())
print("Variance: ",murder_rate.var())
print("Lower Quartile: " ,murder_rate.quantile(0.25))
print("Median: ",murder_rate.quantile(0.5))
print("Median: " ,murder_rate.median())
print("Upper Quartile: " ,murder_rate.quantile(0.75))
print("Skewness: " ,murder_rate.skew())
print("Kurtosis: " ,murder_rate.kurt())
print("Min: ",murder_rate.min())
print("Max: ",murder_rate.max())
```

```
Mean:  murder_rate    4.625
dtype: float64
Standard Deviation:  murder_rate    1.350926
dtype: float64
Variance:  murder_rate    1.825
dtype: float64
Lower Quartile:  murder_rate    4.0
Name: 0.25, dtype: float64
Median:  murder_rate    5.15
Name: 0.5, dtype: float64
Median:  murder_rate    5.15
dtype: float64
Upper Quartile:  murder_rate    5.625
Name: 0.75, dtype: float64
Skewness:  murder_rate   -0.956943
dtype: float64
Kurtosis:  murder_rate   -0.715116
dtype: float64
Min:  murder_rate    2.4
dtype: float64
Max:  murder_rate    5.8
dtype: float64
```

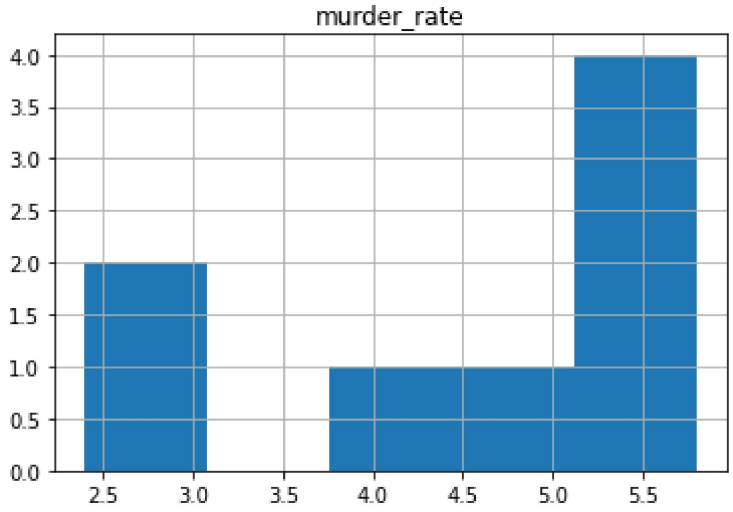
In [28]:
```
df2['murder_rate'].value_counts().plot(kind = 'pie')
```

Out[28]: <AxesSubplot:ylabel='murder_rate'>



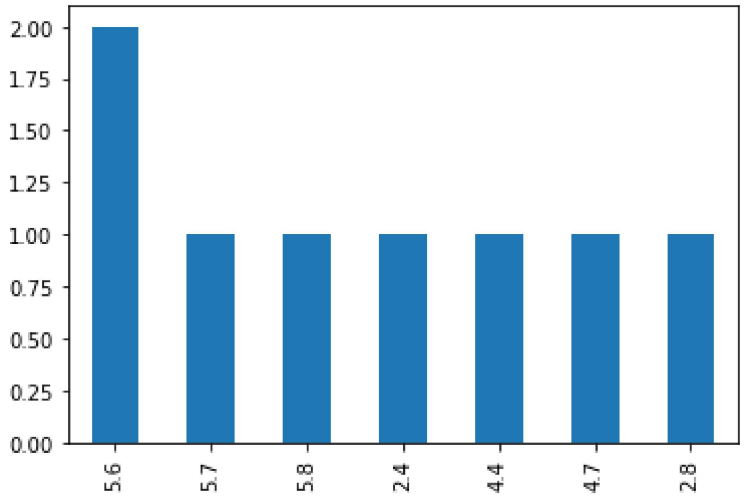
In [29]:
```
df2.hist(column=['murder_rate'], bins = 5)
```

Out[29]:
```
array([[<AxesSubplot:title={'center':'murder_rate'}>]], dtype=object)
```



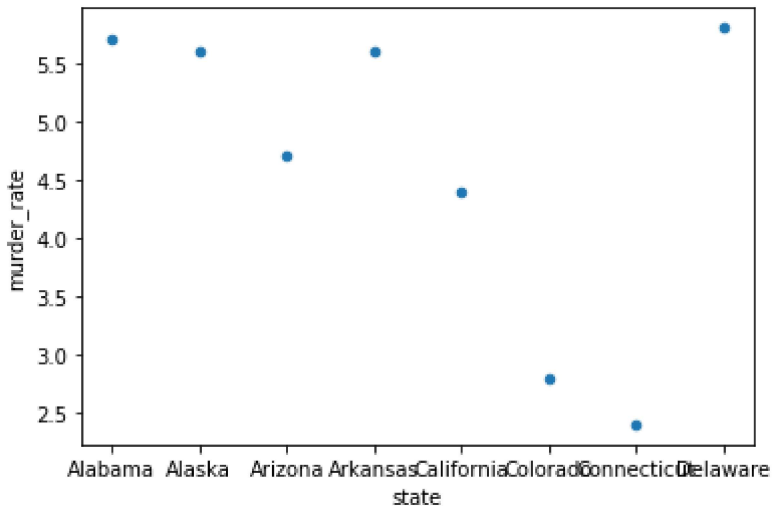
In [30]:
```
df2['murder_rate'].value_counts().plot(kind = 'bar')
```

Out[30]:
```
<AxesSubplot:>
```



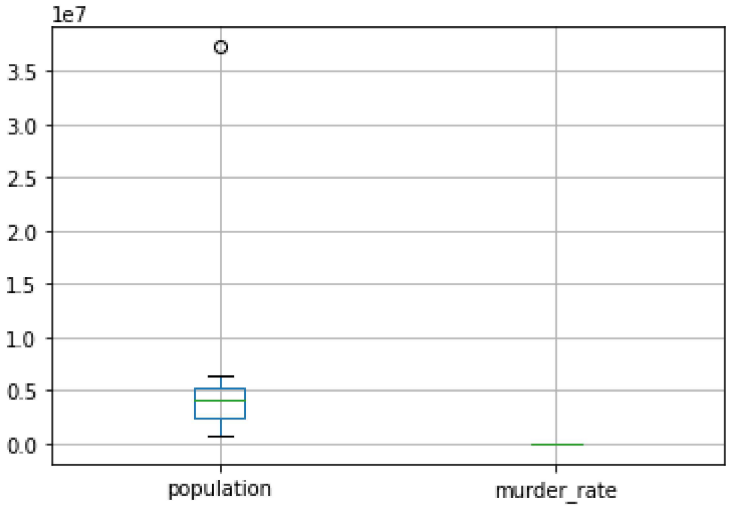
In [31]:
```
df2.plot.scatter(x='state',y='murder_rate')
```

Out[31]: <AxesSubplot:xlabel='state', ylabel='murder_rate'>



In [33]:
```
df2.boxplot(column=['population','murder_rate'])
```

Out[33]: <AxesSubplot:>



Using weather data set

In [34]:
```
df = pd.read_csv('weather.csv')
print(type(df))
print(df)
```

```
<class 'pandas.core.frame.DataFrame'>
     outlook   temperature   humidity   windy  play
0      sunny            85         85   False    no
1      sunny            80         90    True    no
2   overcast            83         86   False   yes
3      rainy            70         96   False   yes
4      rainy            68         80   False   yes
5      rainy            65         70    True    no
6   overcast            64         65    True   yes
7      sunny            72         95   False    no
8      sunny            69         70   False   yes
9      rainy            75         80   False   yes
10     sunny            75         70    True   yes
11  overcast            72         90    True   yes
12  overcast            81         75   False   yes
13     rainy            71         91    True    no
14     rainy           100         70    True    no
15     sunny            45         70    True    no
```

In [35]:
```
print(df.head())
```

```
    outlook   temperature   humidity   windy  play
0     sunny            85         85   False    no
1     sunny            80         90    True    no
2  overcast            83         86   False   yes
3     rainy            70         96   False   yes
4     rainy            68         80   False   yes
```

In [36]:
```
print(df.tail())
```

```
     outlook   temperature   humidity   windy  play
11  overcast            72         90    True   yes
12  overcast            81         75   False   yes
13     rainy            71         91    True    no
14     rainy           100         70    True    no
15     sunny            45         70    True    no
```

In [38]:
```
print(df.describe())
```

```
        temperature   humidity
count     16.000000   16.00000
mean      73.437500   80.18750
std       11.764176   10.36802
min       45.000000   65.00000
25%       68.750000   70.00000
50%       72.000000   80.00000
75%       80.250000   90.00000
max      100.000000   96.00000
```

In [39]:
```
df.columns = ['outlook','temperature','humidity','windy','play']
```

In [40]:
```
t = df['temperature']
print(type(t))
print(t)
```

```
<class 'pandas.core.series.Series'>
0      85
1      80
2      83
3      70
4      68
5      65
6      64
7      72
8      69
9      75
10     75
11     72
12     81
13     71
14    100
15     45
Name: temperature, dtype: int64
```

In [42]:
```
sum = 0
for value in t:
    sum+=value
print(sum)
```

```
1175
```

In [43]:
```
df1 = df[['temperature','humidity']]
print(df1)
```

```
    temperature  humidity
0            85        85
1            80        90
2            83        86
3            70        96
4            68        80
5            65        70
6            64        65
7            72        95
8            69        70
9            75        80
10           75        70
11           72        90
12           81        75
13           71        91
14          100        70
15           45        70
```

In [44]:
```
df2 = df.loc[0:9,['temperature','humidity']]
print(df2)
```

```
   temperature  humidity
0           85        85
1           80        90
2           83        86
3           70        96
4           68        80
5           65        70
6           64        65
7           72        95
8           69        70
9           75        80
```

In [45]:
```
df3 = df.iloc[0:10,[1,2]]
print(df3)
```

```
   temperature  humidity
0           85        85
1           80        90
2           83        86
3           70        96
4           68        80
5           65        70
6           64        65
7           72        95
8           69        70
9           75        80
```

In [46]:
```
df4 = df.iloc[1::2,[0,1,3]]
print(df4)
```

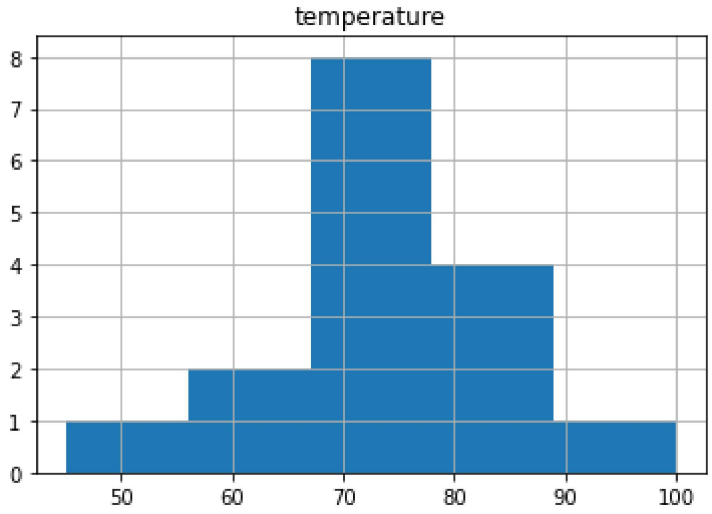
```
     outlook  temperature  windy
1      sunny           80   True
3      rainy           70  False
5      rainy           65   True
7      sunny           72  False
9      rainy           75  False
11  overcast           72   True
13     rainy           71   True
15     sunny           45   True
```

In [47]:
```
temperature = df[['temperature']]
print("Mean: " , temperature.mean())
print("Standard Deviation: ", temperature.std())
print("Variance: ", temperature.var())
print("Lower Quartile: " , temperature.quantile(0.25))
print("Median: ", temperature.quantile(0.5))
print("Median: " , temperature.median())
print("Upper Quartile: " , temperature.quantile(0.75))
print("Skewness: " , temperature.skew())
print("Kurtosis: " , temperature.kurt())
print("Min: ", temperature.min())
print("Max: ", temperature.max())
```

```
Mean:  temperature    73.4375
dtype: float64
Standard Deviation:  temperature    11.764176
dtype: float64
Variance:  temperature    138.395833
dtype: float64
Lower Quartile:  temperature    68.75
Name: 0.25, dtype: float64
Median:  temperature    72.0
Name: 0.5, dtype: float64
Median:  temperature    72.0
dtype: float64
Upper Quartile:  temperature    80.25
Name: 0.75, dtype: float64
Skewness:  temperature   -0.13398
dtype: float64
Kurtosis:  temperature    2.521107
dtype: float64
Min:  temperature    45
dtype: int64
Max:  temperature    100
dtype: int64
```

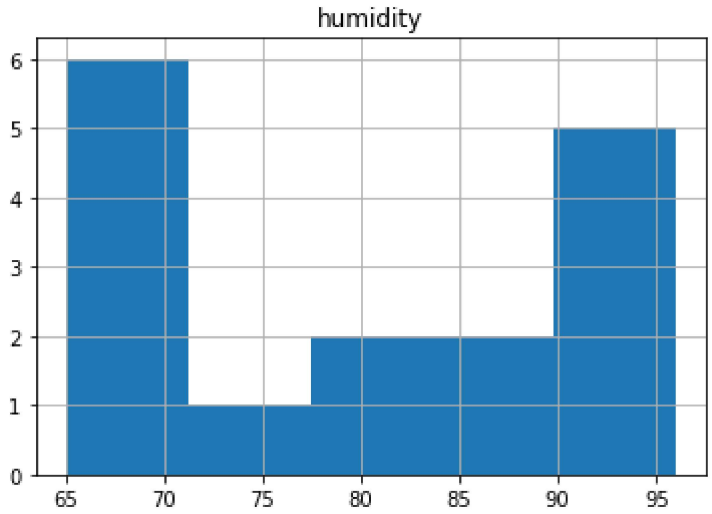
In [48]:
```
df.hist(column=['temperature'], bins = 5)
```

Out[48]:
```
array([[<AxesSubplot:title={'center':'temperature'}>]], dtype=object)
```



In [49]:
```
df.hist(column='humidity', bins = 5)
```

Out[49]:
```
array([[<AxesSubplot:title={'center':'humidity'}>]], dtype=object)
```



In [50]:
```
humidity = df[['humidity']]
print("Mean: " , humidity.mean())
print("Standard Deviation: ", humidity.std())
print("Variance: ", humidity.var())
print("Lower Quartile: " , humidity.quantile(0.25))
print("Median: ", humidity.quantile(0.5))
print("Median: " , humidity.median())
print("Upper Quartile: " , humidity.quantile(0.75))
print("Skewness: " , humidity.skew())
print("Kurtosis: " , humidity.kurt())
print("Min: ", humidity.min())
print("Max: ", humidity.max())
```

```
Mean:  humidity    80.1875
dtype: float64
Standard Deviation:  humidity    10.36802
dtype: float64
Variance:  humidity    107.495833
dtype: float64
Lower Quartile:  humidity    70.0
Name: 0.25, dtype: float64
Median:  humidity    80.0
Name: 0.5, dtype: float64
Median:  humidity    80.0
dtype: float64
Upper Quartile:  humidity    90.0
Name: 0.75, dtype: float64
Skewness:  humidity    0.118669
dtype: float64
Kurtosis:  humidity   -1.533119
dtype: float64
Min:  humidity    65
dtype: int64
Max:  humidity    96
dtype: int64
```

In [51]:
```
list1 = [[1,0], [1,1], [2,2], [2,3], [2,3],
[2,4], [3,4], [3,5], [4,6], [5,7]]
print(list1)
```

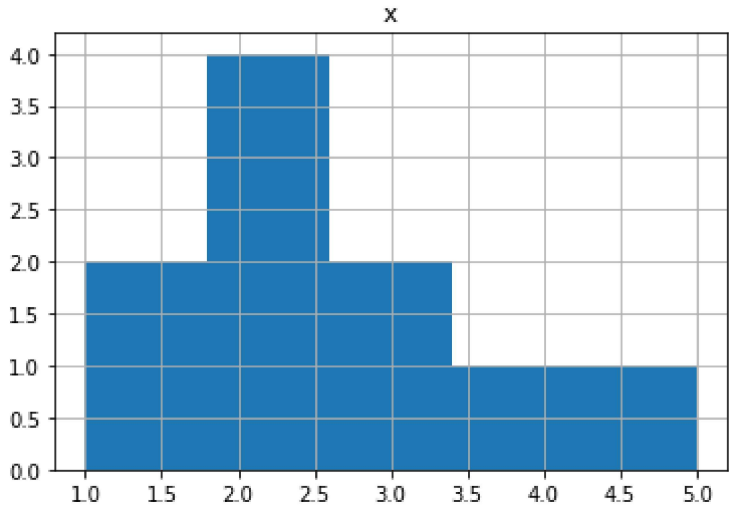
```
[[1, 0], [1, 1], [2, 2], [2, 3], [2, 3], [2, 4], [3, 4], [3, 5], [4, 6], [5,
7]]
```

In [52]:
```
df_list1 = pd.DataFrame(list1, columns = ['x','y'])
print(df_list1)
```

```
   x  y
0  1  0
1  1  1
2  2  2
3  2  3
4  2  3
5  2  4
6  3  4
7  3  5
8  4  6
9  5  7
```

In [53]:
```
df_list1.hist(column = ['x'], bins = 5)
```

Out[53]:
```
array([[<AxesSubplot:title={'center':'x'}>]], dtype=object)
```

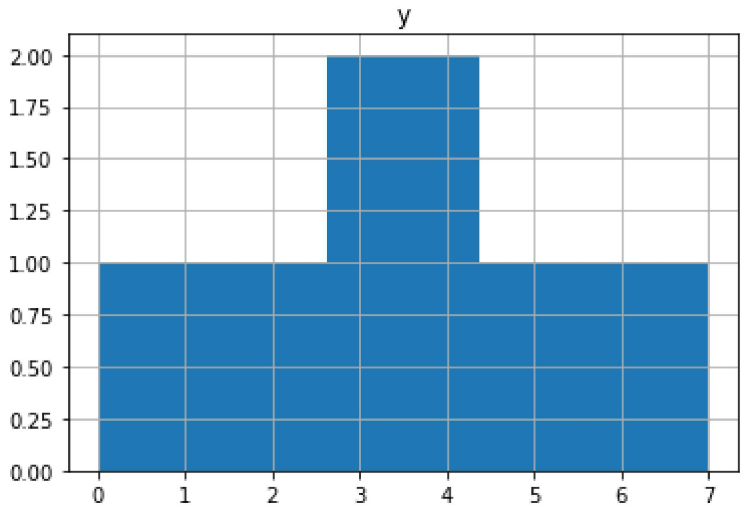


In [55]:
```
print('Skew: ', df_list1[['x']].skew())
```

```
Skew:  x    0.815005
dtype: float64
```

In [56]:
```
df_list1.hist(column = ['y'], bins = 8)
```

Out[56]:
```
array([[<AxesSubplot:title={'center':'y'}>]], dtype=object)
```



In [57]:
```
print('Skew: ', df_list1[['y']].skew())
```

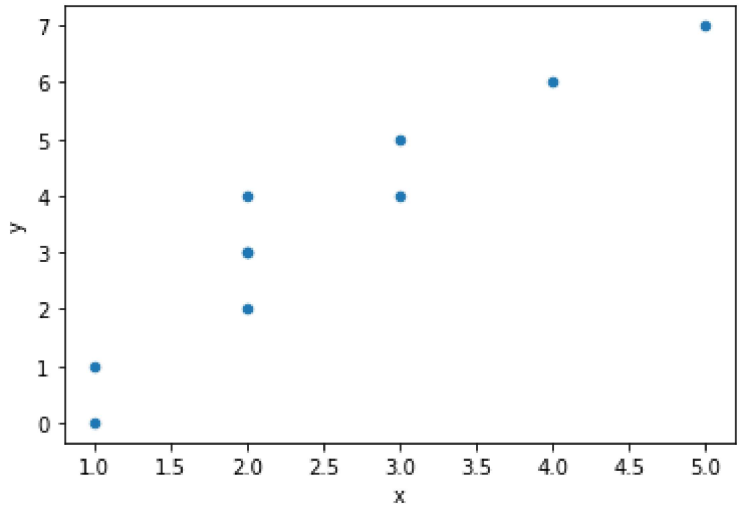
```
Skew:  y    0.0
dtype: float64
```

In [58]:
```
print('Kurt - X: ', df_list1[['x']].kurt())
print('Kurt - Y: ', df_list1[['y']].kurt())
```

```
Kurt - X:  x    0.25378
dtype: float64
Kurt - Y:  y   -0.53564
dtype: float64
```

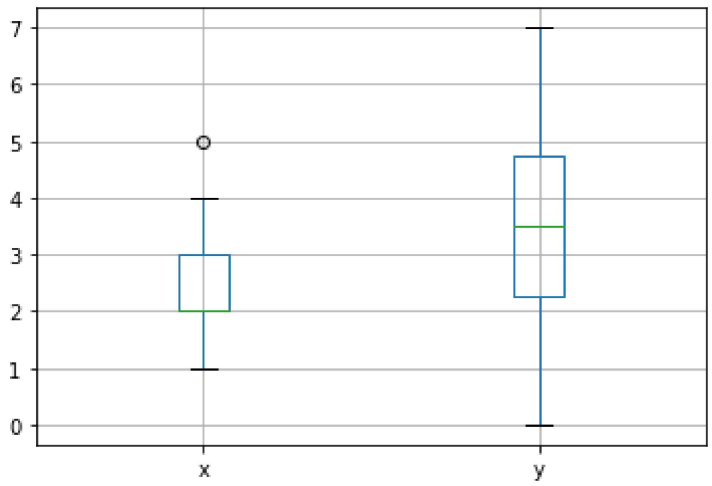
In [59]:
```
df_list1.plot.scatter(x = "x", y = "y")
```

Out[59]: <AxesSubplot:xlabel='x', ylabel='y'>



In [60]:
```
df_list1.boxplot(column = ['x', 'y'])
```

Out[60]: <AxesSubplot:>



In [ ]:
```

```