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

In [4]:
```
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 [5]:
```
# first 5 records
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 [6]:
```
# last 5 records
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 [7]:
```
# description of the dataset
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 [8]:
```
df.columns = ['outlook','temperature','humidity','windy','play']
```

In [9]:
```
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 [10]:
```
sum = 0
for value in t:
    sum+=value
print(sum)
```

```
1175
```

In [11]:
```
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 [12]:
```
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 [13]:
```
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 [14]:
```
# for all odd-numbered index, display outlook, temperature
# and windy column values

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
```

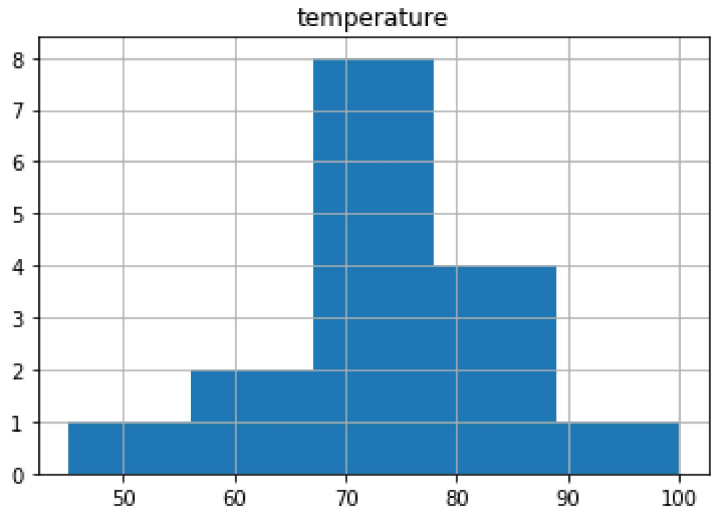
In [15]:
```
# all statistical measures over temperature column
temperature = df[['temperature']]

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
```

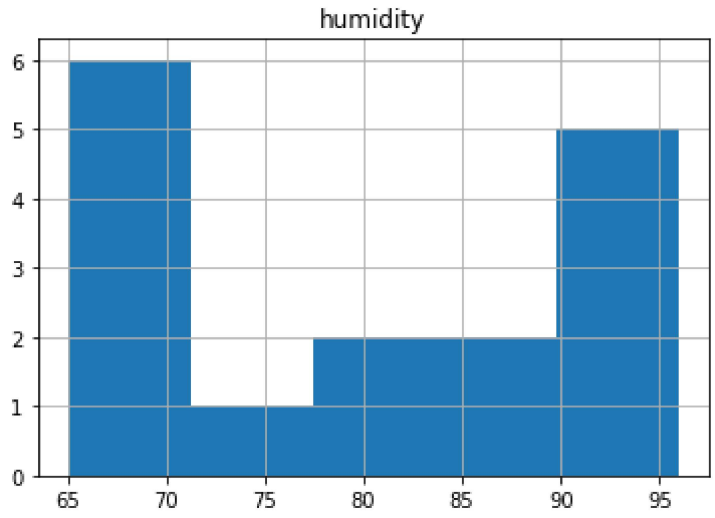
In [16]:
```
df.hist(column=['temperature'], bins = 5)
```

Out[16]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x000001BC7912B9C8
>]],
      dtype=object)
```



In [17]:
```
df.hist(column='humidity', bins = 5)
```

Out[17]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x000001BC78DDDDC8
>]],
      dtype=object)
```



In [18]:
```
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 [19]:
```
list1 = [[1,0], [1,1], [2,2], [2,3], [2,3],
         [2,4], [3,4], [3,5], [4,6], [5,7]]
print(list1)
```

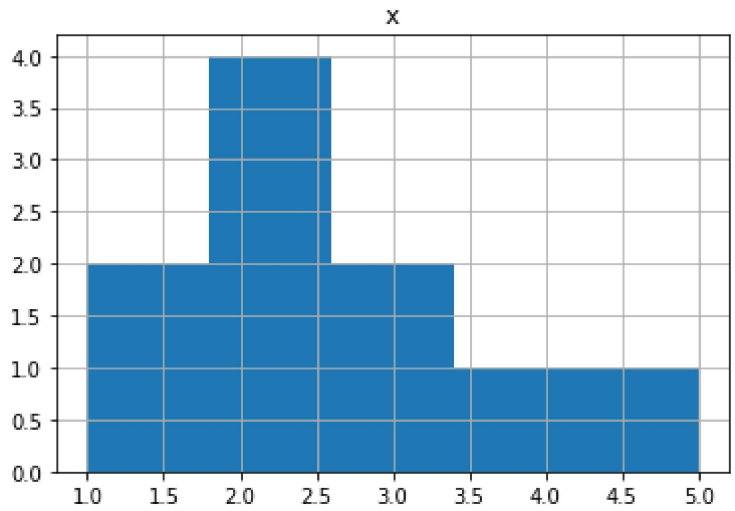
```
[[1, 0], [1, 1], [2, 2], [2, 3], [2, 3], [2, 4], [3, 4], [3, 5], [4, 6], [5,
7]]
```

In [20]:
```
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 [21]:
```
df_list1.hist(column = ['x'], bins = 5)
```

Out[21]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x000001BC7852B3C8
>]],
      dtype=object)
```

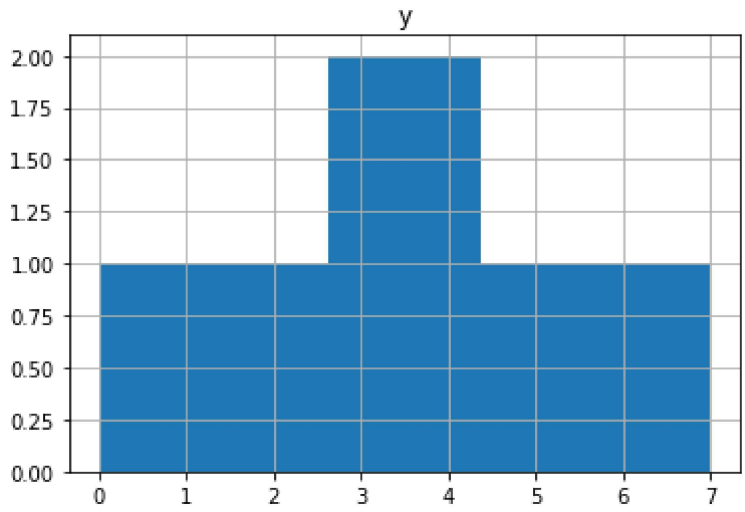


In [22]:
```
print('Skew: ', df_list1[['x']].skew())
```

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

In [23]:
```
df_list1.hist(column = ['y'], bins = 8)
```

Out[23]:
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x000001BC79AED748
>]],
      dtype=object)
```



In [24]:
```
print('Skew: ', df_list1[['y']].skew())
```

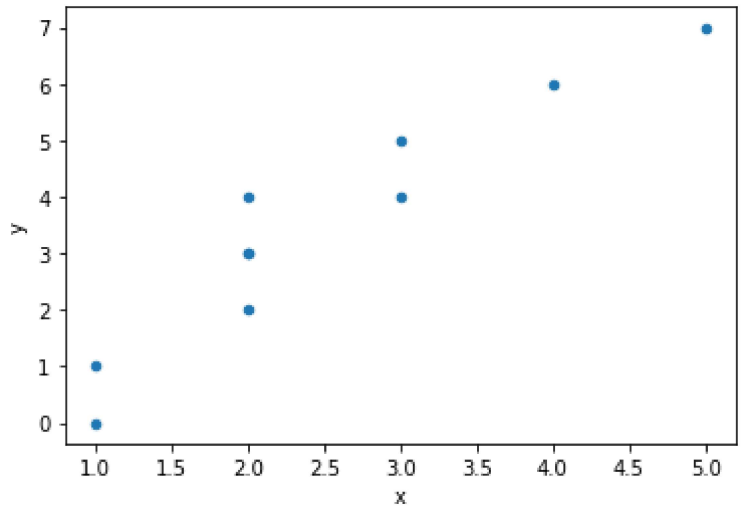
```
Skew:  y    0.0
dtype: float64
```

In [25]:
```
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
```

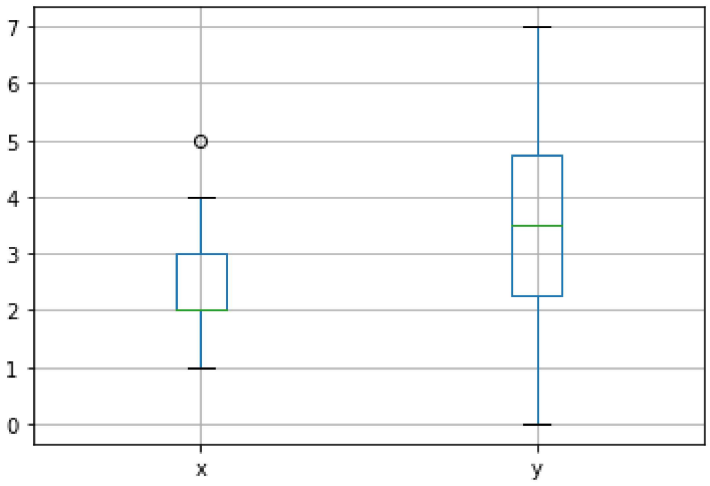
In [26]:
```
df_list1.plot.scatter(x = "x", y = "y")
```

Out[26]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1bc79ad4f48>
```



In [27]:
```
df_list1.boxplot(column = ['x', 'y'])
```

Out[27]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1bc79adcec8>
```



LAB(HANDOUT)

In [28]:
```
import pandas as pd
```

In [29]:
```
obj = pd.Series([4, 7, -5, 3])
```

In [31]:
```
#Filtering data:
obj[obj%2==0]
```

Out[31]:
```
0    4
dtype: int64
```

In [32]:
```
#Scalar Operations:
obj+5, obj * 2
```

Out[32]:
```
(0     9
 1    12
 2     0
 3     8
 dtype: int64,
 0     8
 1    14
 2   -10
 3     6
 dtype: int64)
```

In [33]:
```
#Creating a Series from a Dictionary
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
```

In [34]:
```
#Constructing Pandas DataFrame:
#From List
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
```

In [35]:
```
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
```

In [38]:
```
#From CSV File
df2 = pd.read_csv('sample_data_1.csv', header = None)
df2.columns=['id','state','population','murder_rate']
print(df2)
df2.head() # displays first 5 rows
df2.tail() # displays last 5 rows
df2.count() # displays number of values for each column
```

```
   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[38]:
```
id             8
state          8
population     8
murder_rate    8
dtype: int64
```

In [39]:
```
#Seleting the first cell
print(df1.iloc[0][0])
print(df1.loc[0]['name'])
```

```
1
alice
```

In [46]:
```
#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 [47]:
```
#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 [48]:
```
#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 [49]:
```
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 [59]:
```
#deleting rows/columns from a dataframe
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)#Renaming columns
new_cols = ['n','a','hs']
df12.columns=new_cols
print(df12)
```

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

In [58]:
```
#Data Filtering, Sorting
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)
df.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[58]:

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

In [ ]:
```
1. Boxplot
df.boxplot(column=['col_name_1','col_name_2'])
2. Histogram
df.hist(column = [‘col_name’], bins= 5)
3. Bar Chart
df['col_name'].value_counts().plot(kind = 'bar')
4. Pie Chart
df['col_name'].value_counts().plot(kind = 'pie')
5. Scatter Plot
df.plot.scatter(x='col_name_1',y='col_name_2')
```