stat-assignment-5

September 5, 2024

1 Question-02

[42]:
```
import pandas as pd
d=pd.read_csv('/diabetes_data_upload.csv')
print(d)
```

```
     Age  Gender Polyuria Polydipsia sudden weight loss weakness Polyphagia  \
0     40    Male       No         Yes                 No      Yes         No
1     58    Male       No          No                 No      Yes         No
2     41    Male      Yes          No                 No      Yes        Yes
3     45    Male       No          No                Yes      Yes        Yes
4     60    Male      Yes         Yes                Yes      Yes        Yes
..   ...     ...      ...         ...                ...      ...        ...
515   39  Female      Yes         Yes                Yes       No        Yes
516   48  Female      Yes         Yes                Yes      Yes        Yes
517   58  Female      Yes         Yes                Yes      Yes        Yes
518   32  Female       No          No                 No      Yes         No
519   42    Male       No          No                 No       No         No

    Genital thrush visual blurring Itching Irritability delayed healing  \
0               No              No     Yes           No              Yes
1               No             Yes      No           No               No
2               No              No     Yes           No              Yes
3              Yes              No     Yes           No              Yes
4               No             Yes     Yes          Yes              Yes
..             ...             ...     ...          ...              ...
515             No              No     Yes           No              Yes
516             No              No     Yes          Yes              Yes
517             No             Yes      No           No               No
518             No             Yes     Yes           No              Yes
519             No              No      No           No               No

    partial paresis muscle stiffness Alopecia Obesity     class
0                No              Yes      Yes     Yes  Positive
1               Yes               No      Yes      No  Positive
2                No              Yes      Yes      No  Positive
3                No               No       No      No  Positive
4               Yes              Yes      Yes     Yes  Positive
```

```
..              …                …       …      …        …
515             Yes               No       No      No  Positive
516             Yes               No       No      No  Positive
517             Yes              Yes       No     Yes  Positive
518              No               No      Yes      No  Negative
519              No               No       No      No  Negative

[520 rows x 17 columns]
```

[43]:
```
d.dtypes
```

[43]:
```
Age                  int64
Gender              object
Polyuria            object
Polydipsia          object
sudden weight loss  object
weakness            object
Polyphagia          object
Genital thrush      object
visual blurring     object
Itching             object
Irritability        object
delayed healing     object
partial paresis     object
muscle stiffness    object
Alopecia            object
Obesity             object
class               object
dtype: object
```

[44]:
```
features=d.columns
print(features)
```

```
Index(['Age', 'Gender', 'Polyuria', 'Polydipsia', 'sudden weight loss',
       'weakness', 'Polyphagia', 'Genital thrush', 'visual blurring',
       'Itching', 'Irritability', 'delayed healing', 'partial paresis',
       'muscle stiffness', 'Alopecia', 'Obesity', 'class'],
      dtype='object')
```

[46]:
```
target=d.columns[-1]
print(target)
```

```
class
```

[47]:
```
mapping={'Female':1,'Male':0,'No':3,'Yes':4,'Positive':5,'Negative':6}
d=d.replace(mapping)
print(d)
```

```
     Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
0     40       0         3           4                   3         4
1     58       0         3           3                   3         4
2     41       0         4           3                   3         4
3     45       0         3           3                   4         4
4     60       0         4           4                   4         4
..   …     …       …         …                 …       …
515   39       1         4           4                   4         3
516   48       1         4           4                   4         4
517   58       1         4           4                   4         4
518   32       1         3           3                   3         4
519   42       0         3           3                   3         3

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
0             3               3                3        4             3
1             3               3                4        3             3
2             4               3                3        4             3
3             4               4                3        4             3
4             4               3                4        4             4
..          …             …              …      …           …
515           4               3                3        4             3
516           4               3                3        4             4
517           4               3                4        3             3
518           3               3                4        4             3
519           3               3                3        3             3

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity  \
0                  4                3                 4         4        4
1                  3                4                 3         4        3
2                  4                3                 4         4        3
3                  4                3                 3         3        3
4                  4                4                 4         4        4
..               …              …               …       …      …
515                4                4                 3         3        3
516                4                4                 3         3        3
517                3                4                 4         3        4
518                4                3                 3         4        3
519                3                3                 3         3        3

     class
0        5
1        5
2        5
3        5
4        5
..     …
515      5
516      5
```

```
517      5
518      6
519      6

[520 rows x 17 columns]
```

[48]:
```
df=d-d.min()/(d.max()-d.min())
print(df)
```

```
           Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
0    39.783784     0.0       0.0         1.0                 0.0       1.0
1    57.783784     0.0       0.0         0.0                 0.0       1.0
2    40.783784     0.0       1.0         0.0                 0.0       1.0
3    44.783784     0.0       0.0         0.0                 1.0       1.0
4    59.783784     0.0       1.0         1.0                 1.0       1.0
..         …     …         …           …                   …         …
515  38.783784     1.0       1.0         1.0                 1.0       0.0
516  47.783784     1.0       1.0         1.0                 1.0       1.0
517  57.783784     1.0       1.0         1.0                 1.0       1.0
518  31.783784     1.0       0.0         0.0                 0.0       1.0
519  41.783784     0.0       0.0         0.0                 0.0       0.0

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
0           0.0             0.0              0.0      1.0           0.0
1           0.0             0.0              1.0      0.0           0.0
2           1.0             0.0              0.0      1.0           0.0
3           1.0             1.0              0.0      1.0           0.0
4           1.0             0.0              1.0      1.0           1.0
..          …               …                …        …             …
515         1.0             0.0              0.0      1.0           0.0
516         1.0             0.0              0.0      1.0           1.0
517         1.0             0.0              1.0      0.0           0.0
518         0.0             0.0              1.0      1.0           0.0
519         0.0             0.0              0.0      0.0           0.0

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity  \
0                1.0              0.0               1.0       1.0      1.0
1                0.0              1.0               0.0       1.0      0.0
2                1.0              0.0               1.0       1.0      0.0
3                1.0              0.0               0.0       0.0      0.0
4                1.0              1.0               1.0       1.0      1.0
..               …                …                 …         …        …
515              1.0              1.0               0.0       0.0      0.0
516              1.0              1.0               0.0       0.0      0.0
517              0.0              1.0               1.0       0.0      1.0
518              1.0              0.0               0.0       1.0      0.0
519              0.0              0.0               0.0       0.0      0.0
```

```
     class
0      0.0
1      0.0
2      0.0
3      0.0
4      0.0
..     …
515    0.0
516    0.0
517    0.0
518    1.0
519    1.0

[520 rows x 17 columns]
```

[50]:
```
y=d["class"]
print(y)
```

```
0      5
1      5
2      5
3      5
4      5
      ..
515    5
516    5
517    5
518    6
519    6
Name: class, Length: 520, dtype: int64
```

[51]:
```
x=d.drop("class",axis=1)
print(x)
```

```
     Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
0     40       0         3           4                   3         4
1     58       0         3           3                   3         4
2     41       0         4           3                   3         4
3     45       0         3           3                   4         4
4     60       0         4           4                   4         4
..   …     …       …         …           …                 …        …
515   39       1         4           4                   4         3
516   48       1         4           4                   4         4
517   58       1         4           4                   4         4
518   32       1         3           3                   3         4
519   42       0         3           3                   3         3

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
```

```
0              3               3               3        4              3
1              3               3               4        3              3
2              4               3               3        4              3
3              4               4               3        4              3
4              4               3               4        4              4
..           ...             ...             ...      ...            ...
515            4               3               3        4              3
516            4               3               3        4              4
517            4               3               4        3              3
518            3               3               4        4              3
519            3               3               3        3              3

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity
0                  4                3                 4         4        4
1                  3                4                 3         4        3
2                  4                3                 4         4        3
3                  4                3                 3         3        3
4                  4                4                 4         4        4
..               ...              ...               ...       ...      ...
515                4                4                 3         3        3
516                4                4                 3         3        3
517                3                4                 4         3        4
518                4                3                 3         4        3
519                3                3                 3         3        3

[520 rows x 16 columns]
```

[52]:
```
x = x.replace({'Gender': {'Male': 0, 'Female': 1},
                   'Polyuria': {'Yes': 1, 'No': 0},
                   'Polydipsia': {'Yes': 1, 'No': 0},
                   'sudden weight loss': {'Yes': 1, 'No': 0},
                   'weakness': {'Yes': 1, 'No': 0},
                   'Polyphagia': {'Yes': 1, 'No': 0},
                   'Genital thrush': {'Yes': 1, 'No': 0},
                   'visual blurring': {'Yes': 1, 'No': 0},
                   'Itching': {'Yes': 1, 'No': 0},
                   'Irritability': {'Yes': 1, 'No': 0},
                   'delayed healing': {'Yes': 1, 'No': 0},
                   'partial paresis': {'Yes': 1, 'No': 0},
                   'muscle stiffness': {'Yes': 1, 'No': 0},
                   'Alopecia': {'Yes': 1, 'No': 0},
                   'Obesity': {'Yes': 1, 'No': 0}})
print(x)
```

```
    Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
0    40       0         3           4                   3         4
1    58       0         3           3                   3         4
2    41       0         4           3                   3         4
```

```
3     45       0         3           3                   4         4
4     60       0         4           4                   4         4
..   ...     ...       ...         ...                 ...       ...
515   39       1         4           4                   4         3
516   48       1         4           4                   4         4
517   58       1         4           4                   4         4
518   32       1         3           3                   3         4
519   42       0         3           3                   3         3

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
0             3               3                3        4             3
1             3               3                4        3             3
2             4               3                3        4             3
3             4               4                3        4             3
4             4               3                4        4             4
..          ...             ...              ...      ...           ...
515           4               3                3        4             3
516           4               3                3        4             4
517           4               3                4        3             3
518           3               3                4        4             3
519           3               3                3        3             3

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity
0                  4                3                 4         4        4
1                  3                4                 3         4        3
2                  4                3                 4         4        3
3                  4                3                 3         3        3
4                  4                4                 4         4        4
..               ...              ...               ...       ...      ...
515                4                4                 3         3        3
516                4                4                 3         3        3
517                3                4                 4         3        4
518                4                3                 3         4        3
519                3                3                 3         3        3

[520 rows x 16 columns]
```

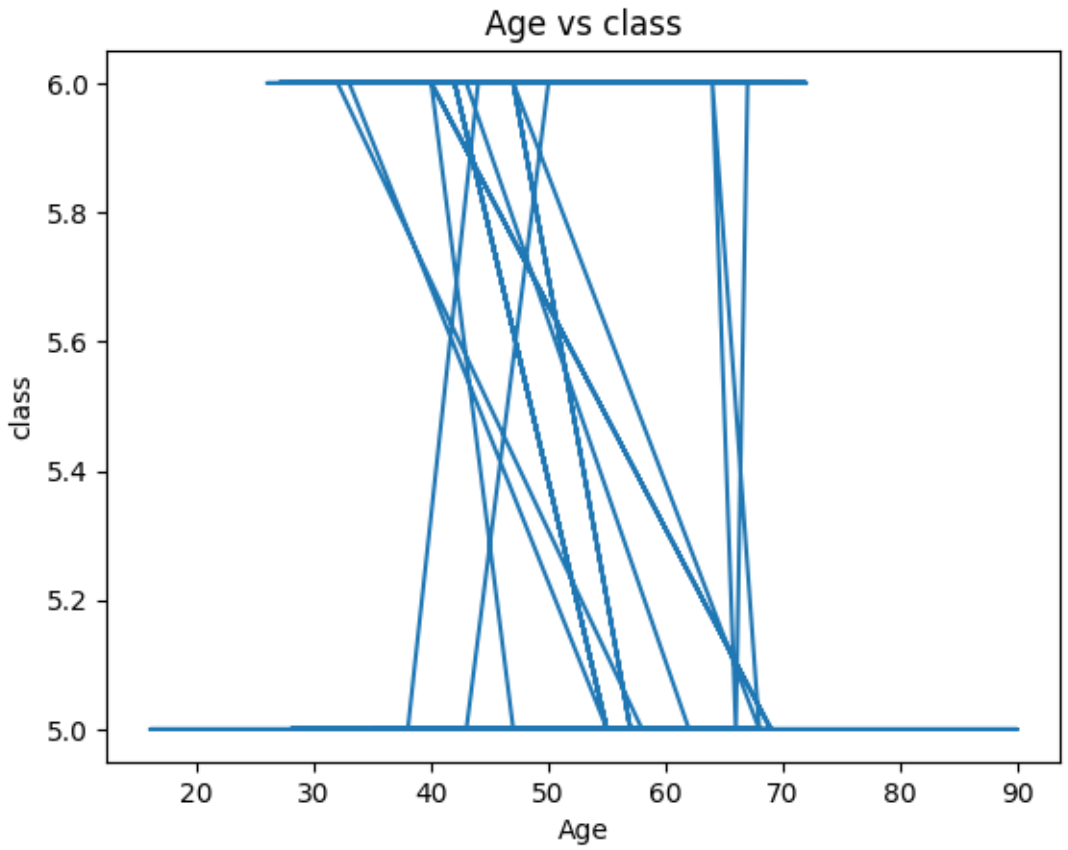
[53]:
```
y = y.replace({'Positive': 0, 'Negative': 1})
print(y)
```

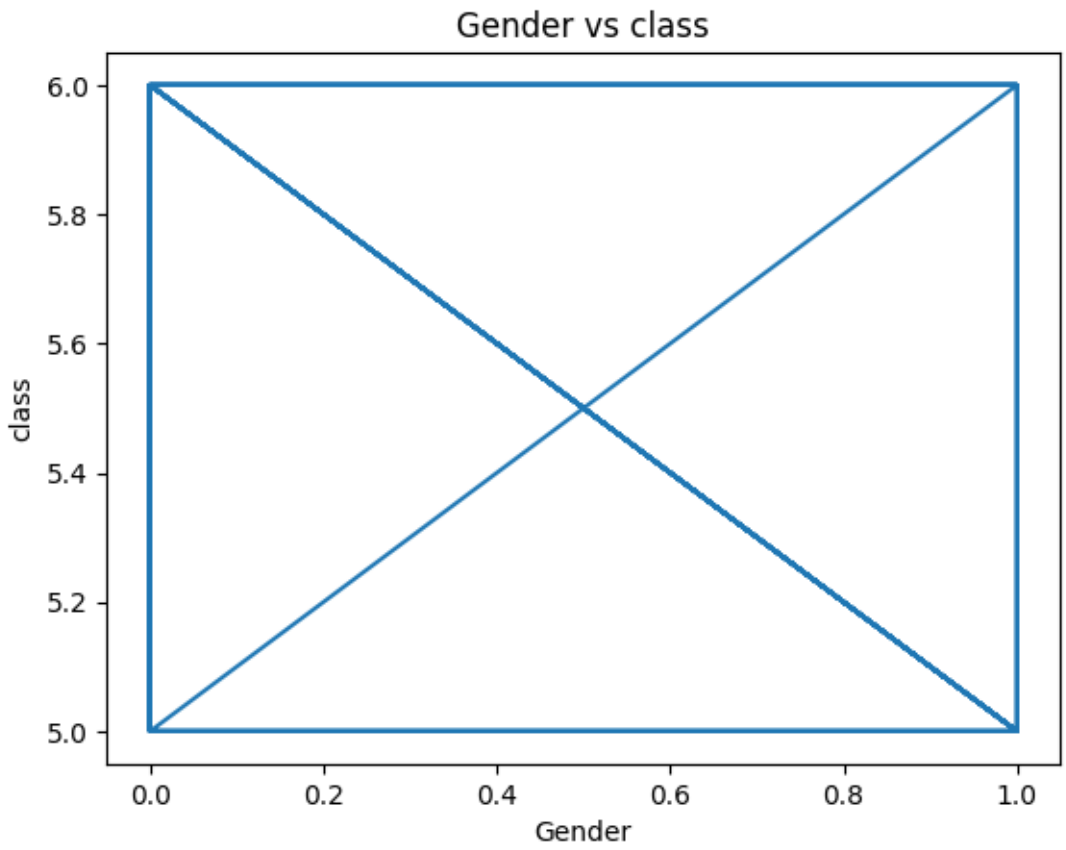
```
0      5
1      5
2      5
3      5
4      5
      ..
515    5
516    5
```

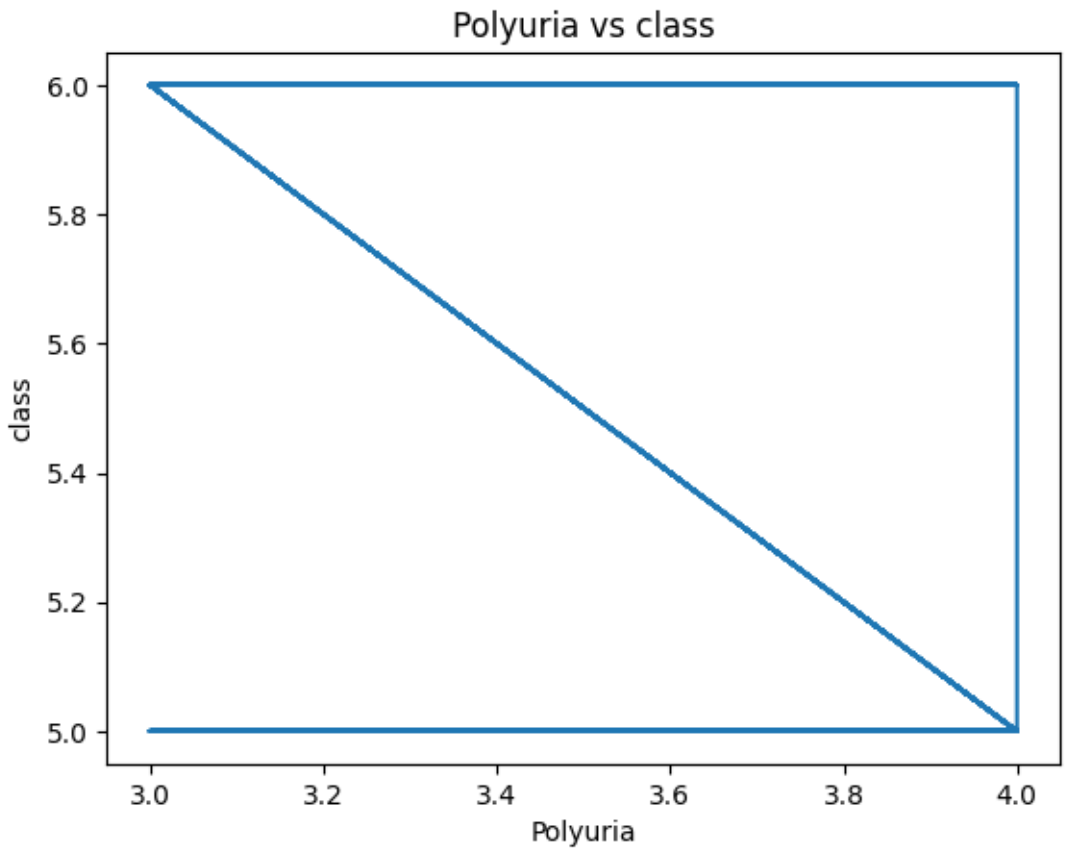
```
517    5
518    6
519    6
Name: class, Length: 520, dtype: int64
```

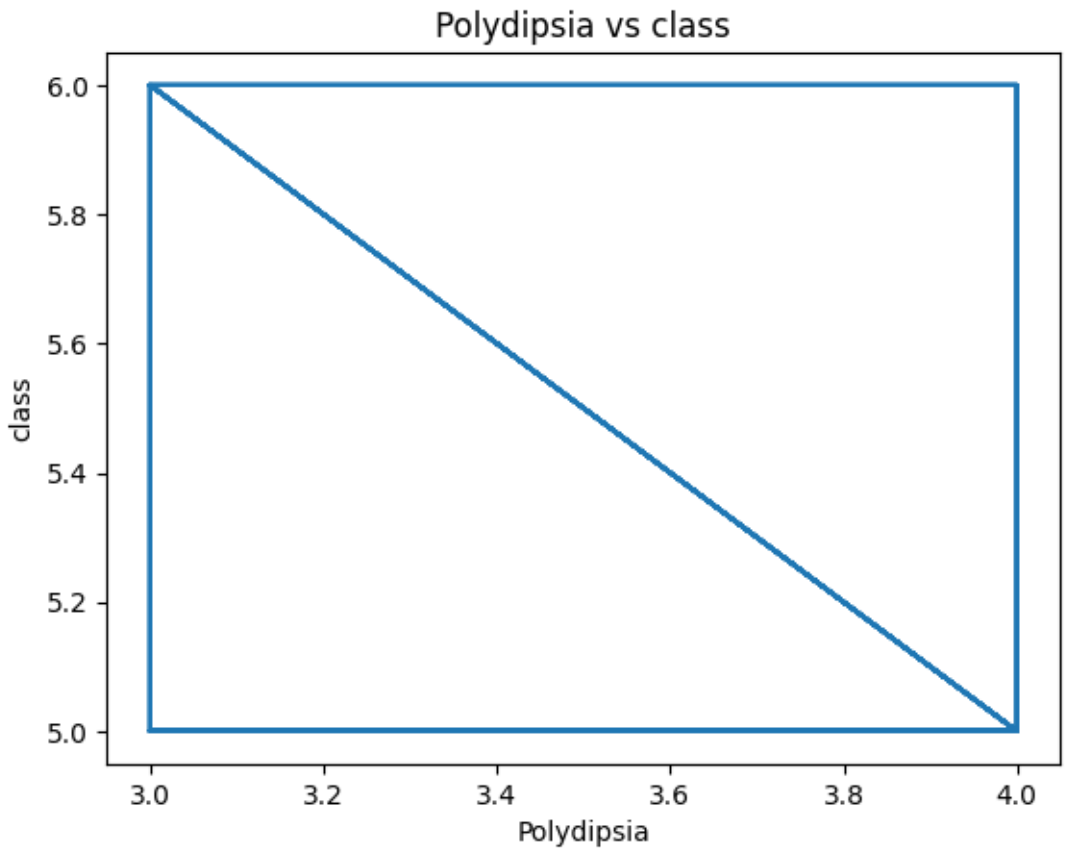
[54]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

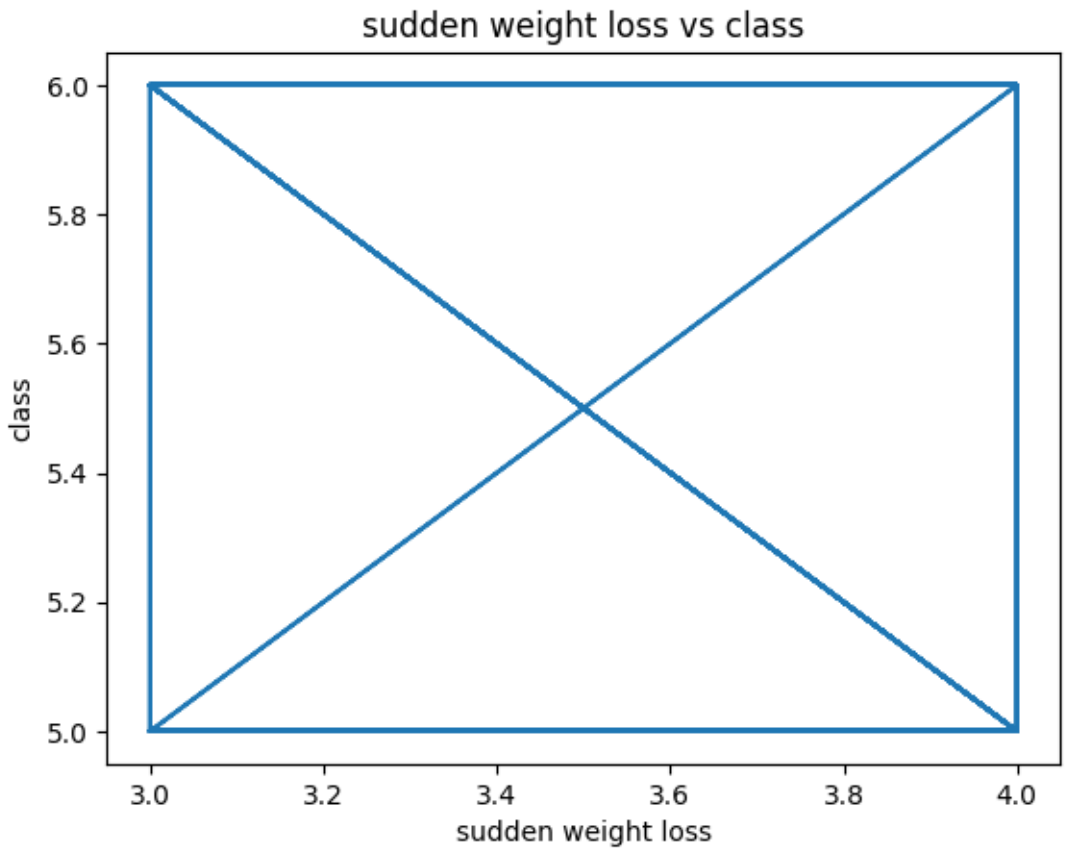
[55]:
```
for column in x.columns:
  plt.plot(x[column], y)
  plt.xlabel(column)
  plt.ylabel('class')
  plt.title(f'{column} vs class')
  plt.show()
```

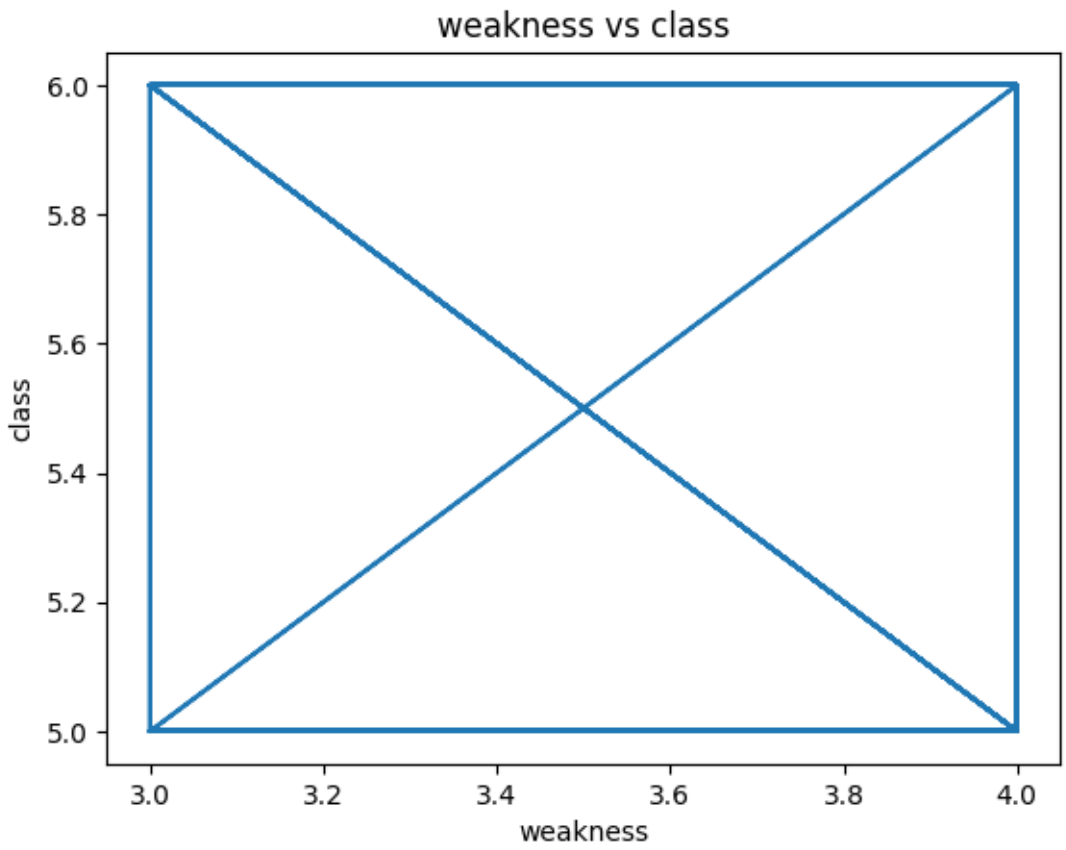


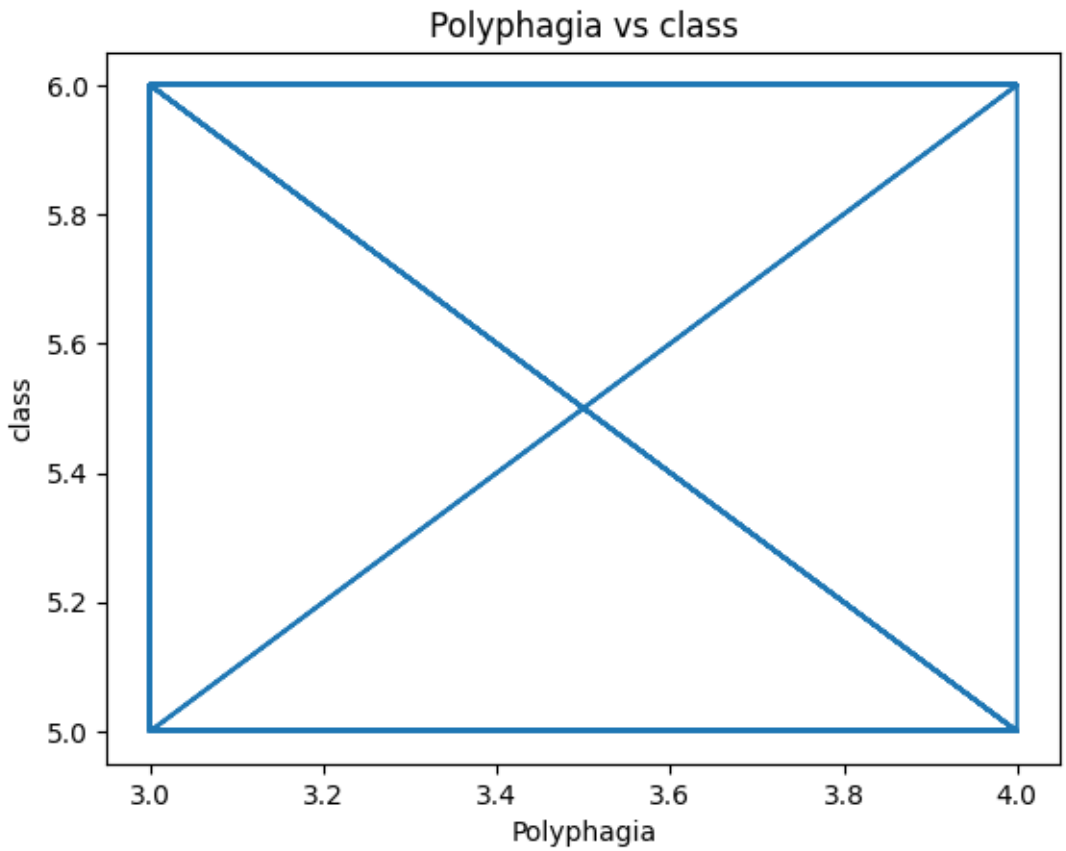

Gender vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
0.0
0.2
0.4
0.6
0.8
1.0
Gender

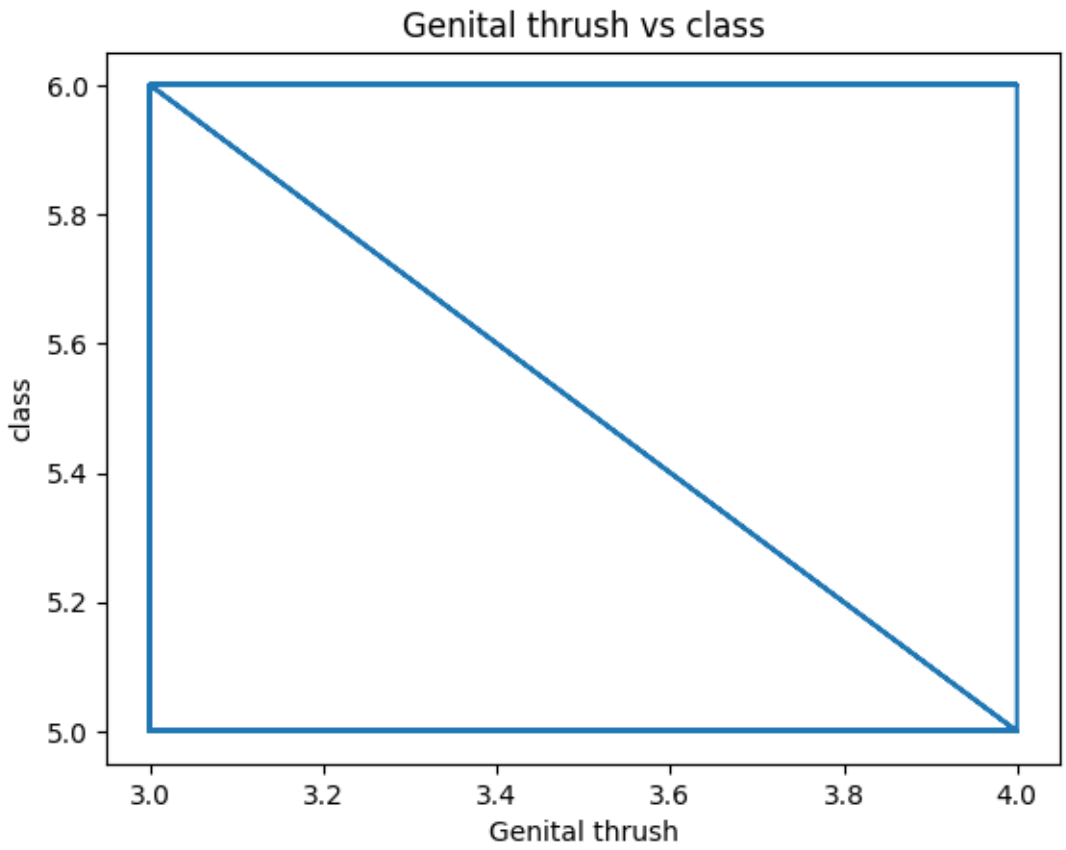

Polyuria vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Polyuria

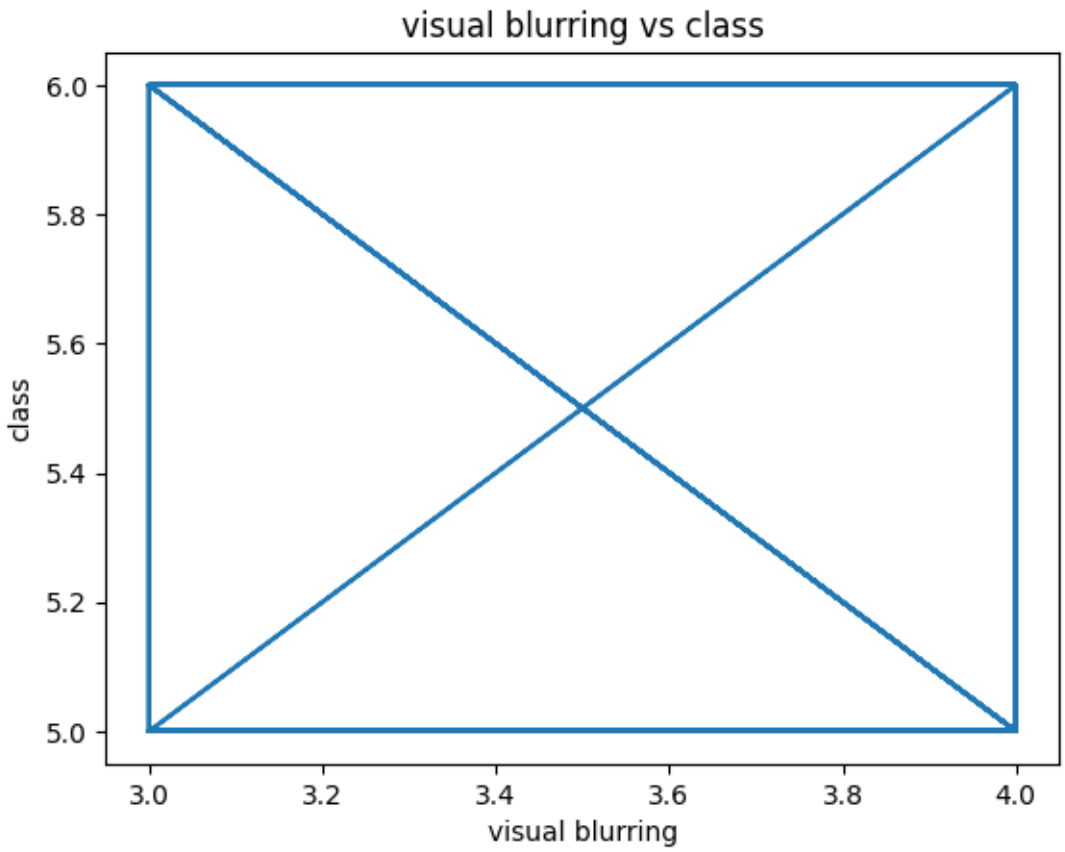

Polydipsia vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Polydipsia

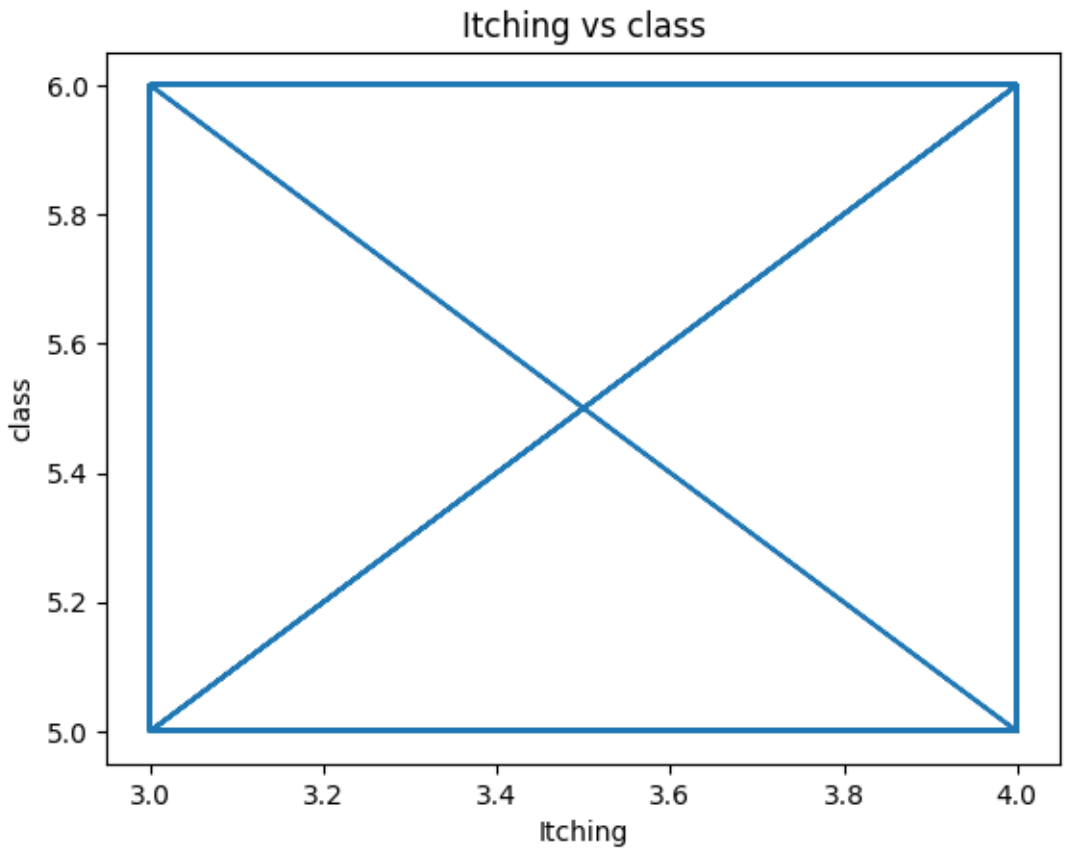

sudden weight loss vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
sudden weight loss

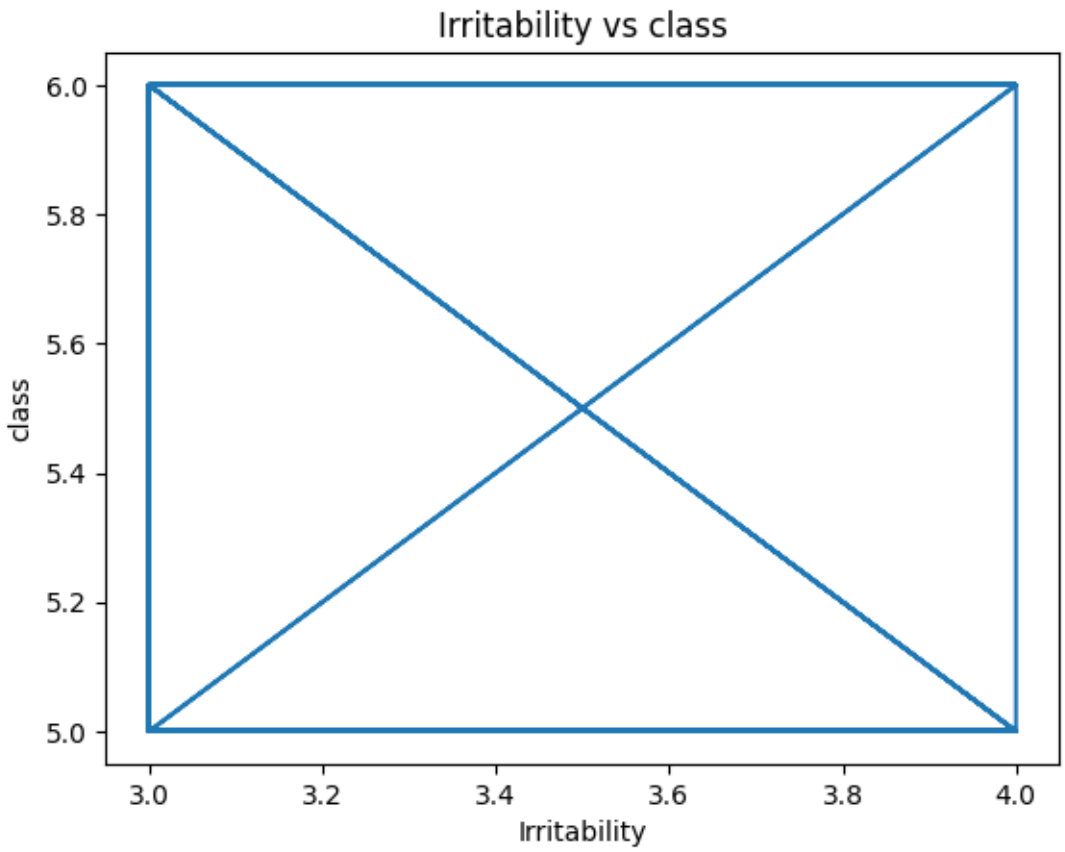

weakness vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
weakness

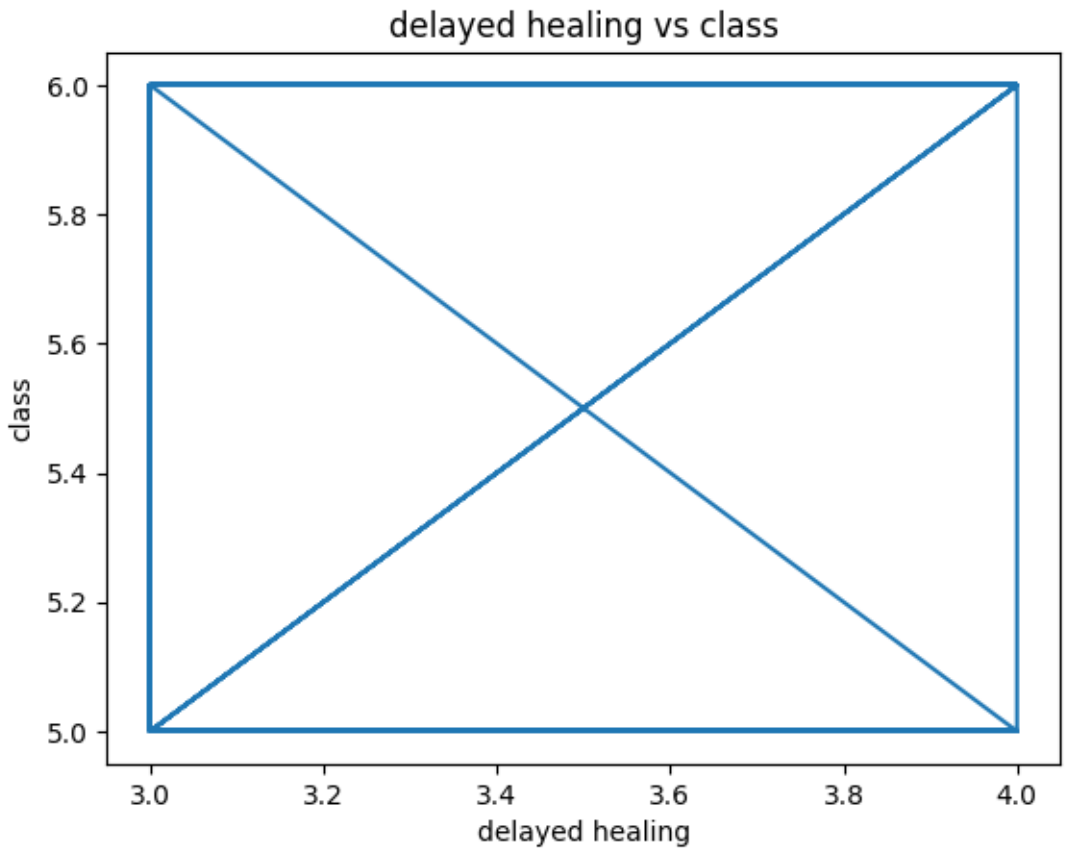

Polyphagia vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Polyphagia

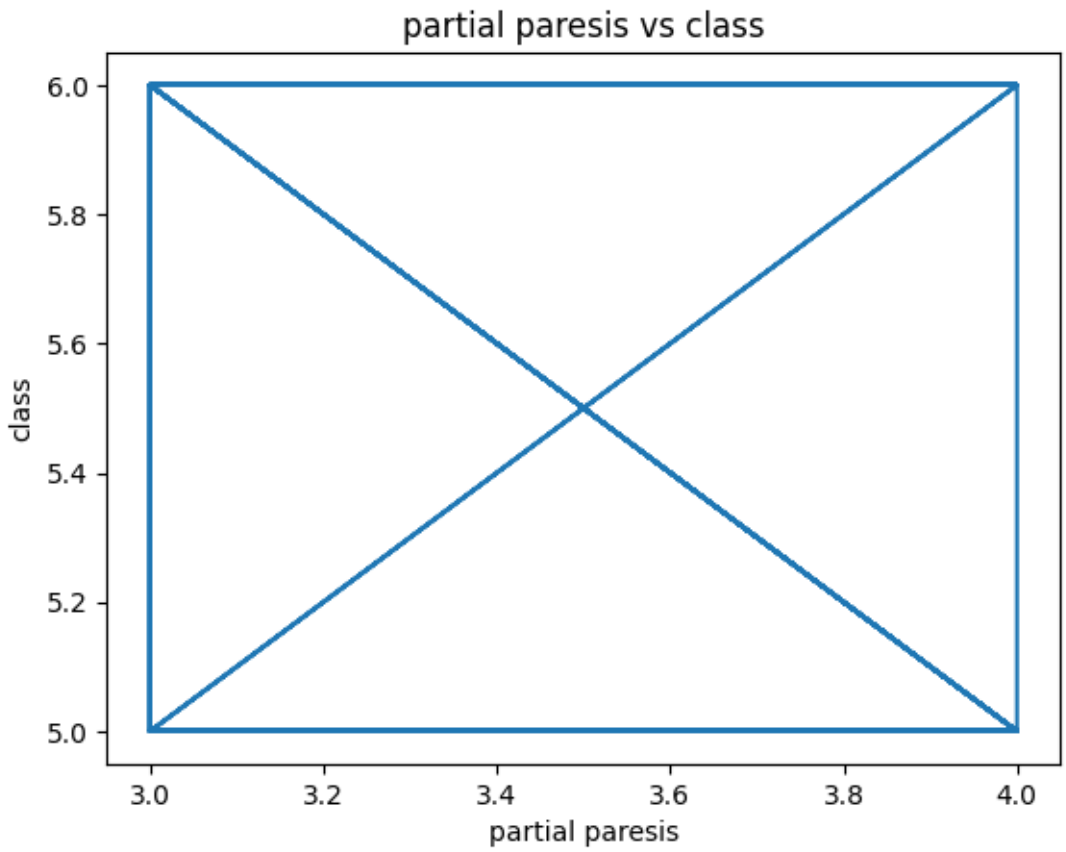

Genital thrush vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Genital thrush

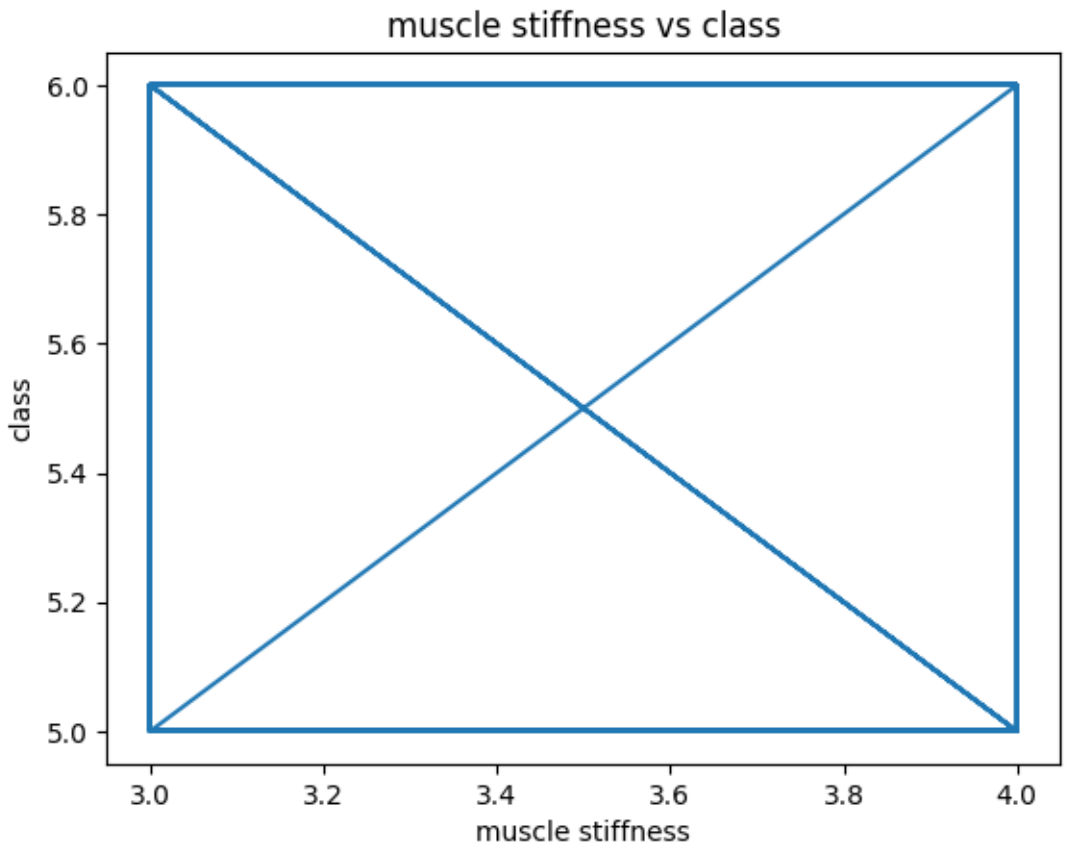

visual blurring vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
visual blurring

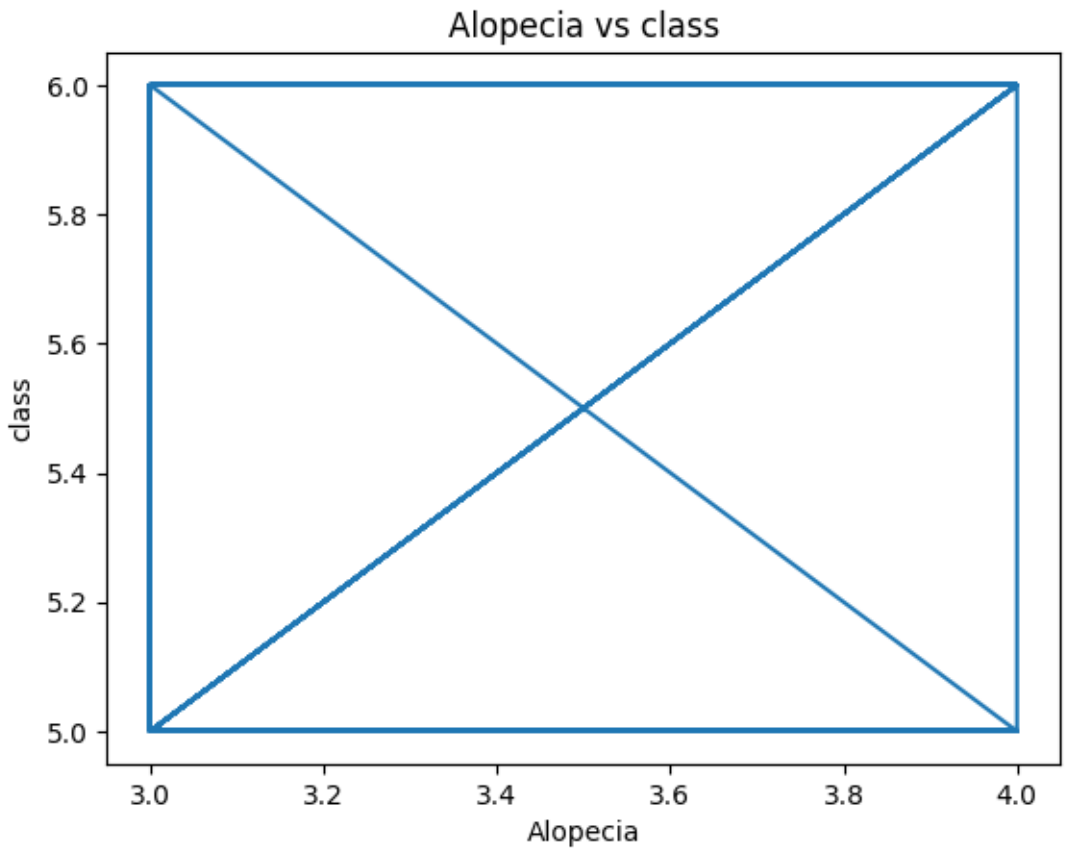

Itching vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Itching

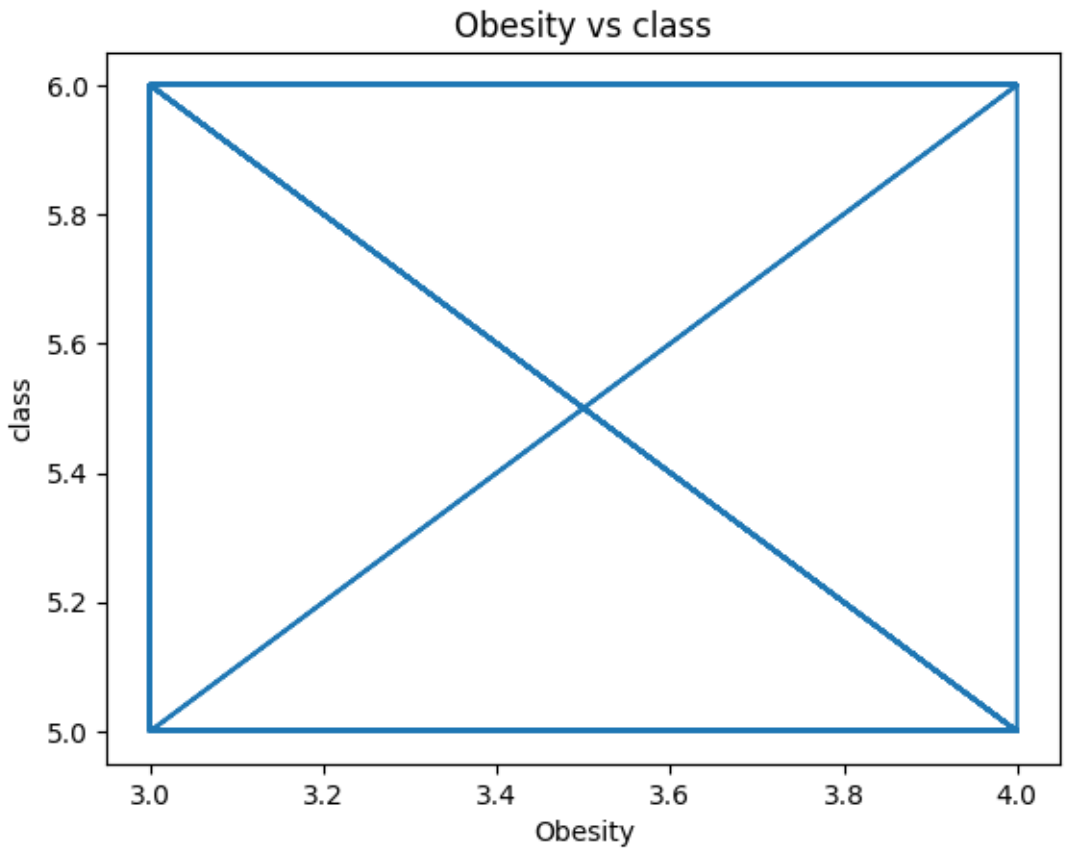

Irritability vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Irritability


delayed healing vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
delayed healing


partial paresis vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
partial paresis


muscle stiffness vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
muscle stiffness


Alopecia vs class
6.0
5.8
5.6
5.4
5.2
5.0
class
3.0
3.2
3.4
3.6
3.8
4.0
Alopecia



[56]:
```
x.isnull().sum()
x.fillna(0, inplace=True)
print(x)
```

```
     Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
0     40       0         3           4                   3         4
1     58       0         3           3                   3         4
2     41       0         4           3                   3         4
3     45       0         3           3                   4         4
4     60       0         4           4                   4         4
..   ...     ...       ...         ...                 ...       ...
515   39       1         4           4                   4         3
516   48       1         4           4                   4         4
517   58       1         4           4                   4         4
518   32       1         3           3                   3         4
519   42       0         3           3                   3         3

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
0             3               3                3        4             3
1             3               3                4        3             3
```

```
2              4                3                3        4             3
3              4                4                3        4             3
4              4                3                4        4             4
..           …                …                …      …           …
515            4                3                3        4             3
516            4                3                3        4             4
517            4                3                4        3             3
518            3                3                4        4             3
519            3                3                3        3             3

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity
0                  4                3                 4         4        4
1                  3                4                 3         4        3
2                  4                3                 4         4        3
3                  4                3                 3         3        3
4                  4                4                 4         4        4
..               …                …                 …       …       …
515                4                4                 3         3        3
516                4                4                 3         3        3
517                3                4                 4         3        4
518                4                3                 3         4        3
519                3                3                 3         3        3

[520 rows x 16 columns]
```

[57]:
```
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split
```

[58]:
```
scaler = MinMaxScaler()
x_norm = pd.DataFrame(scaler.fit_transform(x), columns=x.columns)
print(x_norm)
```

```
          Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
0    0.324324     0.0       0.0         1.0                 0.0       1.0
1    0.567568     0.0       0.0         0.0                 0.0       1.0
2    0.337838     0.0       1.0         0.0                 0.0       1.0
3    0.391892     0.0       0.0         0.0                 1.0       1.0
4    0.594595     0.0       1.0         1.0                 1.0       1.0
..        …     …       …         …                 …       …
515  0.310811     1.0       1.0         1.0                 1.0       0.0
516  0.432432     1.0       1.0         1.0                 1.0       1.0
517  0.567568     1.0       1.0         1.0                 1.0       1.0
518  0.216216     1.0       0.0         0.0                 0.0       1.0
519  0.351351     0.0       0.0         0.0                 0.0       0.0

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
0           0.0             0.0              0.0      1.0           0.0
1           0.0             0.0              1.0      0.0           0.0
```

```
2           1.0             0.0             0.0      1.0           0.0
3           1.0             1.0             0.0      1.0           0.0
4           1.0             0.0             1.0      1.0           1.0
..          …               …               …        …             …
515         1.0             0.0             0.0      1.0           0.0
516         1.0             0.0             0.0      1.0           1.0
517         1.0             0.0             1.0      0.0           0.0
518         0.0             0.0             1.0      1.0           0.0
519         0.0             0.0             0.0      0.0           0.0

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity
0                1.0              0.0               1.0       1.0      1.0
1                0.0              1.0               0.0       1.0      0.0
2                1.0              0.0               1.0       1.0      0.0
3                1.0              0.0               0.0       0.0      0.0
4                1.0              1.0               1.0       1.0      1.0
..               …                …                 …         …        …
515              1.0              1.0               0.0       0.0      0.0
516              1.0              1.0               0.0       0.0      0.0
517              0.0              1.0               1.0       0.0      1.0
518              1.0              0.0               0.0       1.0      0.0
519              0.0              0.0               0.0       0.0      0.0

[520 rows x 16 columns]
```

[59]:
```
xtrain,xtest,ytrain,ytest = train_test_split(x,y,test_size=0.2, random_state=30)
print(xtrain)
print(xtest)
print(ytrain)
print(ytest)
```

```
     Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
195   31       0         4           3                   3         3
349   37       0         3           3                   3         3
257   48       1         4           4                   3         4
157   48       0         4           4                   4         3
459   57       0         4           4                   4         4
..   …     …       …         …                   …       …
430   32       0         3           3                   3         3
145   61       0         4           3                   3         4
140   47       0         4           4                   3         3
500   66       0         4           3                   4         3
421   61       1         4           3                   3         3

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
195           4               3                4        3             3
349           3               3                3        3             3
257           3               3                4        4             3
```

```
157           4               4               3        3             3
459           4               3               4        3             3
..          …               …               …      …           …
430           3               4               3        3             4
145           4               4               4        4             4
140           3               3               3        3             3
500           3               4               3        4             4
421           4               3               3        3             4

     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity
195                3                 4                 3         4        3
349                3                 3                 3         3        3
257                4                 4                 3         3        3
157                4                 3                 3         3        3
459                3                 4                 3         3        3
..               …                 …                 …       …      …
430                4                 3                 3         3        4
145                4                 4                 3         3        3
140                3                 3                 4         3        3
500                3                 3                 3         4        3
421                3                 3                 3         4        3

[416 rows x 16 columns]
     Age  Gender  Polyuria  Polydipsia  sudden weight loss  weakness  \
248   42       0         3           3                   3         3
60    65       1         4           4                   3         4
162   35       1         3           3                   3         3
391   58       0         3           4                   3         3
493   44       0         4           3                   4         4
..   …     …       …         …                 …       …
188   70       0         4           3                   4         4
158   56       0         4           3                   4         4
363   68       1         4           4                   3         4
164   48       1         4           4                   4         4
42    50       1         3           4                   3         4

     Polyphagia  Genital thrush  visual blurring  Itching  Irritability  \
248           3               3                3        3             3
60            4               3                3        4             3
162           3               3                3        3             3
391           3               3                4        4             3
493           3               4                3        4             3
..          …               …                …      …           …
188           4               4                3        3             4
158           3               4                3        4             4
363           4               3                4        4             3
164           4               3                4        4             4
42            4               3                4        4             4
```

```
     delayed healing  partial paresis  muscle stiffness  Alopecia  Obesity
248                3                3                 3         4        3
60                 3                4                 4         3        3
162                3                3                 3         3        3
391                3                3                 4         3        3
493                4                3                 3         4        4
..               ...              ...               ...       ...      ...
188                4                4                 4         4        3
158                3                3                 3         4        3
363                4                4                 3         3        3
164                4                4                 4         3        3
42                 4                4                 4         3        3

[104 rows x 16 columns]
195    5
349    6
257    5
157    5
459    5
      ..
430    5
145    5
140    5
500    5
421    5
Name: class, Length: 416, dtype: int64
248    6
60     5
162    5
391    6
493    6
      ..
188    5
158    5
363    5
164    5
42     5
Name: class, Length: 104, dtype: int64
```

2 Question-01

[60]:
```
import pandas as pd
d=pd.read_csv('/content/Salary_Data.csv')
print(d)
```

```
    YearsExperience    Salary
```

```
0                1.1   39343.0
1                1.3   46205.0
2                1.5   37731.0
3                2.0   43525.0
4                2.2   39891.0
5                2.9   56642.0
6                3.0   60150.0
7                3.2   54445.0
8                3.2   64445.0
9                3.7   57189.0
10               3.9   63218.0
11               4.0   55794.0
12               4.0   56957.0
13               4.1   57081.0
14               4.5   61111.0
15               4.9   67938.0
16               5.1   66029.0
17               5.3   83088.0
18               5.9   81363.0
19               6.0   93940.0
20               6.8   91738.0
21               7.1   98273.0
22               7.9  101302.0
23               8.2  113812.0
24               8.7  109431.0
25               9.0  105582.0
26               9.5  116969.0
27               9.6  112635.0
28              10.3  122391.0
29              10.5  121872.0
```

[61]:
```
d.dtypes
```

[61]:
```
YearsExperience    float64
Salary             float64
dtype: object
```

[62]:
```
features=d.columns
print(features)
```

```
Index(['YearsExperience', 'Salary'], dtype='object')
```

[63]:
```
target=d.columns[-1]
print(target)
```

```
Salary
```

[64]:
```
y=d['Salary']
print(y)
```

```
0      39343.0
1      46205.0
2      37731.0
3      43525.0
4      39891.0
5      56642.0
6      60150.0
7      54445.0
8      64445.0
9      57189.0
10     63218.0
11     55794.0
12     56957.0
13     57081.0
14     61111.0
15     67938.0
16     66029.0
17     83088.0
18     81363.0
19     93940.0
20     91738.0
21     98273.0
22    101302.0
23    113812.0
24    109431.0
25    105582.0
26    116969.0
27    112635.0
28    122391.0
29    121872.0
Name: Salary, dtype: float64
```

[65]:
```
x=d.drop('Salary',axis=1)
print(x)
```

```
    YearsExperience
0               1.1
1               1.3
2               1.5
3               2.0
4               2.2
5               2.9
6               3.0
7               3.2
8               3.2
```

```
9               3.7
10              3.9
11              4.0
12              4.0
13              4.1
14              4.5
15              4.9
16              5.1
17              5.3
18              5.9
19              6.0
20              6.8
21              7.1
22              7.9
23              8.2
24              8.7
25              9.0
26              9.5
27              9.6
28             10.3
29             10.5
```

[66]:
```
plt.scatter(d['YearsExperience'], d['Salary'])
plt.xlabel('YearsExperience')
plt.ylabel('Salary')
plt.title('YearsExperience vs Salary')
plt.show()
```

[67]:
```
d_norm = (d - d.min()) / (d.max() - d.min())
print(d_norm)
```

```
    YearsExperience    Salary
0          0.000000  0.019041
1          0.021277  0.100094
2          0.042553  0.000000
3          0.095745  0.068438
4          0.117021  0.025514
5          0.191489  0.223376
6          0.202128  0.264812
7          0.223404  0.197425
8          0.223404  0.315545
9          0.276596  0.229837
10         0.297872  0.301051
11         0.308511  0.213359
12         0.308511  0.227097
13         0.319149  0.228561
14         0.361702  0.276163
15         0.404255  0.356804
16         0.425532  0.334255
```

17	0.446809	0.535755
18	0.510638	0.515379
19	0.521277	0.663938
20	0.606383	0.637928
21	0.638298	0.715119
22	0.723404	0.750898
23	0.755319	0.898665
24	0.808511	0.846917
25	0.840426	0.801453
26	0.893617	0.935956
27	0.904255	0.884763
28	0.978723	1.000000
29	1.000000	0.993870