In [1]:

```
# Author : Amir Shokri
# github link : https://github.com/amirshnll/dermatology
# dataset link : http://archive.ics.uci.edu/ml/datasets/Dermatology
# email : amirsh.nll@gmail.com
```

In [2]:

```
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
from sklearn.decomposition import PCA
from sklearn.model_selection import train_test_split
from sklearn.metrics import f1_score
from sklearn.metrics import accuracy_score
```

In [3]:

```
data = pd.read_csv('dermatology_data.csv', header=None)
```

In [4]:

```
data = data.replace(to_replace="?", method='ffill')
```

In [5]:

```
data.describe()
```

Out[5]:

	0	1	2	3	4	5	6	
count	366.000000	366.000000	366.000000	366.000000	366.000000	366.000000	366.000000	366
mean	2.068306	1.795082	1.549180	1.366120	0.633880	0.448087	0.166667	0
std	0.664753	0.701527	0.907525	1.138299	0.908016	0.957327	0.570588	0
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0
25%	2.000000	1.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0
50%	2.000000	2.000000	2.000000	1.000000	0.000000	0.000000	0.000000	0
75%	2.000000	2.000000	2.000000	2.000000	1.000000	0.000000	0.000000	0
max	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3

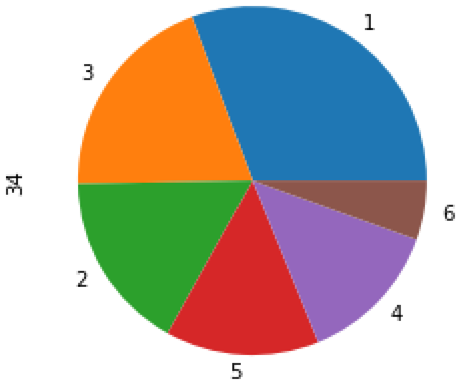
8 rows × 34 columns

In [6]:

```
properties = data[data.columns[:34]]
target = data[data.columns[34]]
scaler = MinMaxScaler()
scaled_x = scaler.fit_transform(properties)
```

```
In [7]:  target.value_counts().plot.pie()

Out[7]:  <matplotlib.axes._subplots.AxesSubplot at 0x23b944ca7f0>
```



```
In [8]:  pca = PCA(n_components=15)
         reduced_x = pca.fit_transform(scaled_x)
```

```
In [9]:  X_train, X_test, y_train, y_test = train_test_split(reduced_x, target, test_si
         ze=0.3, random_state=0)
```

```
In [10]: from sklearn.naive_bayes import GaussianNB
         from sklearn.neural_network import MLPClassifier
         from sklearn.neighbors import KNeighborsClassifier
         from sklearn.tree import DecisionTreeClassifier
         from sklearn.linear_model import LogisticRegression
```

```
In [11]: gnb = GaussianNB()
         mlp = MLPClassifier(hidden_layer_sizes=(100, 100))
         knn = KNeighborsClassifier(n_neighbors=5)
         dt = DecisionTreeClassifier()
         regressor = LogisticRegression()
```

In [12]:

```
gnb.fit(X_train, y_train)
y_predgnb = gnb.predict(X_test)

mlp.fit(X_train, y_train)
y_predmlp = mlp.predict(X_test)

knn.fit(X_train, y_train)
y_predknn = knn.predict(X_test)

dt.fit(X_train, y_train)
y_preddt = dt.predict(X_test)

regressor.fit(X_train, y_train)
y_predregressor = regressor.predict(X_test)
```

```
C:\Users\Amirshnll\anaconda3\lib\site-packages\sklearn\neural_network\_multil
ayer_perceptron.py:582: ConvergenceWarning: Stochastic Optimizer: Maximum ite
rations (200) reached and the optimization hasn't converged yet.
  warnings.warn(
```

In [13]:

```
print('gnb f1: ', f1_score(y_test, y_predgnb, average='micro'))
print('gnb accuracy: ', accuracy_score(y_test, y_predgnb))

print('mlp f1: ', f1_score(y_test, y_predmlp, average='micro'))
print('mlp accuracy: ', accuracy_score(y_test, y_predmlp))

print('knn f1: ', f1_score(y_test, y_predgnb, average='micro'))
print('knn accuracy: ', accuracy_score(y_test, y_predknn))

print('decision tree f1: ', f1_score(y_test, y_predgnb, average='micro'))
print('decision tree accuracy: ', accuracy_score(y_test, y_preddt))

print('logistic regression f1: ', f1_score(y_test, y_predgnb, average='micro'
))
print('logistic regression accuracy: ', accuracy_score(y_test, y_predregressor
))
```

```
gnb f1:  0.9727272727272728
gnb accuracy:  0.9727272727272728
mlp f1:  1.0
mlp accuracy:  1.0
knn f1:  0.9727272727272728
knn accuracy:  0.9818181818181818
decision tree f1:  0.9727272727272728
decision tree accuracy:  0.9090909090909091
logistic regression f1:  0.9727272727272728
logistic regression accuracy:  0.990909090909091
```