

In [2]:

```
from sklearn.metrics import confusion_matrix
```

```
c:\Users\Wuser\Wap\data\local\W\programs\Wpython\Wpython37\lib\Wimportlib\W_bootstrap.py:2
19: RuntimeWarning: numpy.ufunc size changed, may indicate binary incompatibility.
Expected 192 from C header, got 216 from PyObject
    return f(*args, **kwargs)
```

In [5]:

```
trueY = [1,1,1,1,1,0,0,0,0,0]
predY = [0,1,1,1,0,0,0,0,0,1]
result = confusion_matrix(trueY,predY)
```

In [6]:

```
result.shape
```

Out[6]:

(2, 2)

In [7]:

```
result
#0->0 : 4
'''    이쪽이 pred
    0 = non-spam | 1 = spam
0    4          1
1    2          3
이쪽이
actual (sklearn의 특징)'''
```

Out[7]:

```
array([[4, 1],
       [2, 3]], dtype=int64)
```

In [8]:

```
result.T
'''이쪽이 actual
    0 = non-spam | 1 = spam
0    4          2
1    1          3
이쪽이
pred (sklearn 전치)'''
'''
열: Actual
행: prediction
'''
```

Out[8]:

```
array([[4, 2],
       [1, 3]], dtype=int64)
```

In [9]:

```
result.T.shape
```

Out[9]:

(2, 2)

In [17]:

```
total = result.sum()
_sum = 0

for i in range(result.T.shape[0]):
    P = result[i,i]/result[:,i].sum()
    R = result[i,i]/result[i].sum()
    print("Precision:", i, P)
    print("Recall:", i, R)
    print("F1-Score:", i, 2*P*R/(P+R))
```

```
Precision: 0 0.6666666666666666
Recall: 0 0.8
F1-Score: 0 0.7272727272727272
Precision: 1 0.75
Recall: 1 0.6
F1-Score: 1 0.6666666666666665
```

In [18]:

```
print("Accuracy:", i, _sum/total)
```

Accuracy: 1 0.0

In [ ]:

```
trueY = [2,0,2,2,0,1]
predY = [0,0,2,2,0,2]
```

```
'''
predict

Actual  0    1    2
        0    2    0    0
        1    0    0    1
        2    1    0    2
'''
```

```
class0: P=2/3,R=2/2,F1
class1: P=0/0,R=0/1,F1
class2: P=2/3,R=2/3,F1
P = P + P + P / 3
R = R + R + R / 3
```

In [19]:

```
from sklearn.metrics import classification_report  
print(classification_report(trueY, predY))
```

	precision	recall	f1-score	support
0	0.67	0.80	0.73	5
1	0.75	0.60	0.67	5
accuracy			0.70	10
macro avg	0.71	0.70	0.70	10
weighted avg	0.71	0.70	0.70	10