Q5 AdaBoost

In [1]:

```
Turples = [[0,-1],[1,-1],[2,-1],[3,1],[4,1],[5,1],[6,1],[7,1],[8,-1],[9,-1]]
```

In [24]:

```
def classfier_M(turple,v):
    error = 0
    if turple[0] < v:
        if turple[1] != -1:
            error = 1
    elif turple[0] > v:
        if turple[1] != 1:
            error = 1
    return error
```

5.a

In [28]:

```
w = [float(1)/10]*10
for v in range(9):
    e = [0]*10
    for i in range(10):
        e[i] = float(w[i])*classfier_M(Turples[i],v)

    print sum(e)
```

```
0.4
0.3
0.2
0.2
0.3
0.4
0.5
0.6
0.6
```

we can find the value is symmetric, and the optimation point is 2 and 3

So the classfier should be :

v = 2 or 3: if x < v, y = -1; if x > v, y = 1

5.b

The weighted error rate for all 10 data are:

In [30]:

```
v = 2
e = [0]*10
for i in range(10):
    e[i] = float(w[i])*classfier_M(Turples[i],v)
    print e[i]
```

```
0.0
0.0
0.0
0.0
0.0
0.0
0.0
0.0
0.1
0.1
```

5.c

In [33]:

```
w2 = [0]*10
for i in range(10):
    w2[i] = float(w[i])*e[i]/(1-e[i])
```

In [36]:

```
w2_norm = [0]*10
for i in range(10):
    w2_norm[i] = float(w2[i])/sum(w2)
```

In [38]:

```
w2_norm
```

Out[38]:

```
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.5, 0.5]
```

5.d

In [40]:

```
for v in range(10):
    e = [0]*10
    for i in range(10):
        e[i] = float(w2_norm[i])*classfier_M(Turples[i],v)

    print sum(e)
```

```
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
0.5
0.0
```

we can find the value is symmetric, and the optimation point is 10

So the classfier should be :

v = 10: if x < v, y = -1; if x > v, y = 1

5.e

```
The ensemble h should be:

    v = 2 or 3:
    if x < v, y = -1;
    if x > v, y = 1;

If the classifier answer is wrong, for the set of wrong data:
    v = 10:
    if x < v, y = -1;
    if x > v, y = 1
```