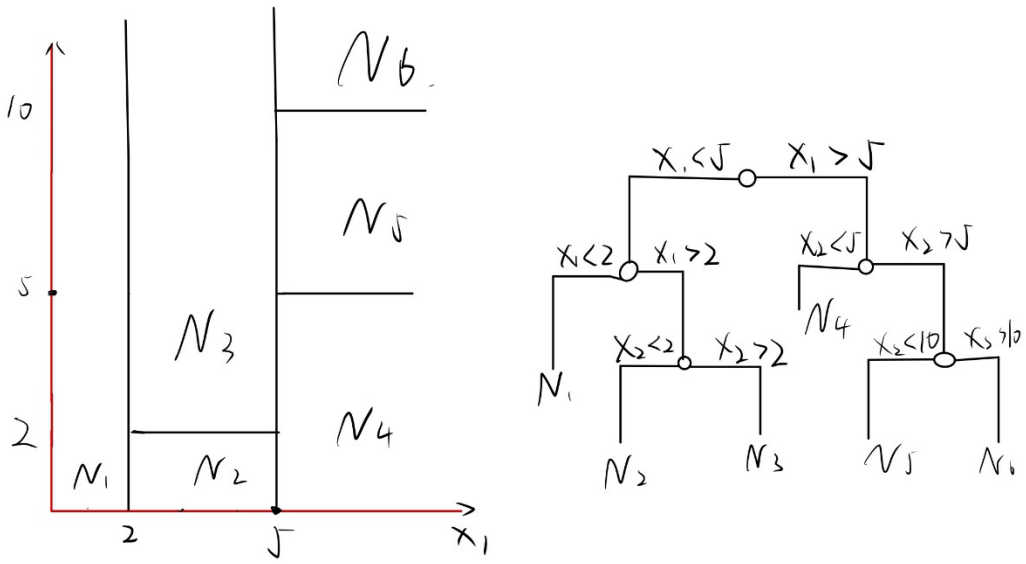
Exercise 8.4:

1.



2.

In a setting with two classes, p_{mk} is the proportion of observations of class k in region m. So, classification error E equals to

$$E = \begin{cases} p_{mk}, & 0 \leq p_{mk} \leq 0.5 \\ 1 - p_{mk}, & 0.5 \leq p_{mk} \leq 1 \end{cases}$$

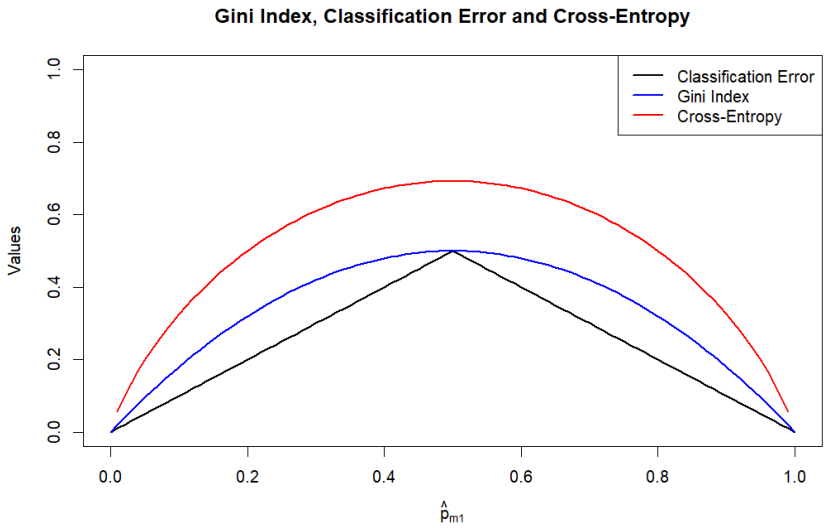
Gini index equals to

$$G = p_{m1} * (1 - p_{m1}) + p_{m2} * (1 - p_{m2})$$

Cross entropy equals to

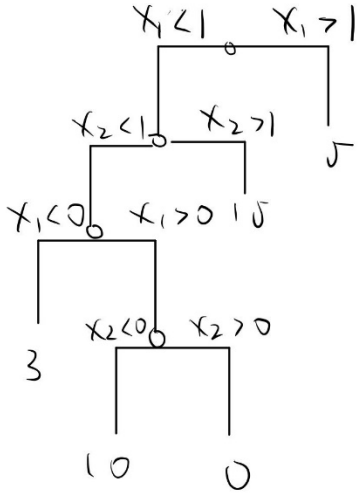
$$D = -p_{m1} * logp_{m1} - p_{m2} * logp_{m2}$$

The plot is like

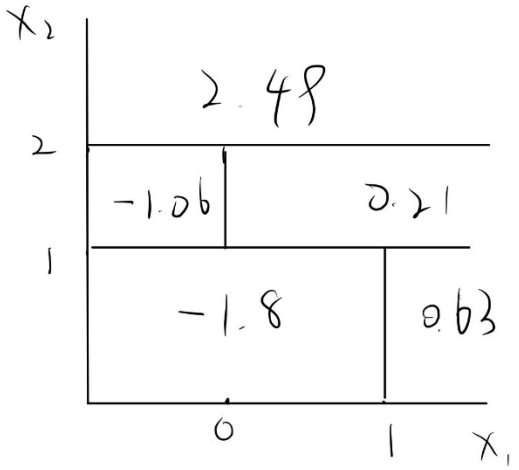


3.

(a)


$X_1<1$
$X_1>1$
5
$X_2<1$
$X_2>1$
$X_1<0$
$X_1>0$
$X_2<0$
$X_2>0$
3
10
0

(b)


X_2
2.48
2
-1.06
0.21
1
-1.8
0.63
0
1
X_1