Q3:-

X_1	X_2	X_3	y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

$$Entropy = \frac{-4}{8}\log_2\frac{4}{8} - \frac{4}{8}\log_2\frac{4}{8} = 1$$

for X_1

	P_i	N_i	$I(P_i, N_i)$
0	2	2	1
1	2	2	1

$$Entropy(X_1) = +\frac{4}{8} * 1 + \frac{4}{8} * 1 = 1$$

$$\therefore IG(X_1) = 0$$

for X_2 i

	P_i	N_i	$I(P_i, N_i)$
0	2	2	1
1	2	2	1

$Entropy(X_2) = 1 \Rightarrow IG(X_2) = 0$

for X_3:

	P_i	N_i	$I(P_i, N_i)$
0	2	2	1
1	2	2	1

$IG(X_3) = 0$

So we choose arbitrarily X_1 to be root node

while $X_1 = 1$

	P_i	N_i	I
0	1	1	1
1	1	1	1

$IG = 0$

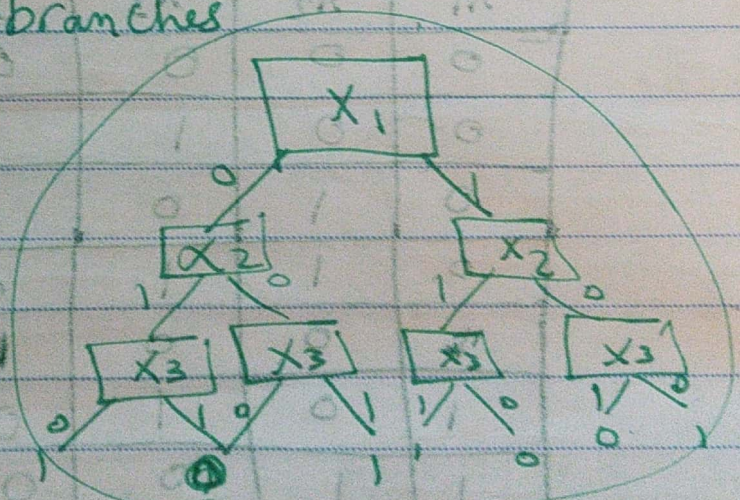
	P_i	N_i	I
0	1	1	1
1	1	1	1

$IG = \infty$

while $X_1 = 0$

Same

So we Choose X_2 for both branches



The Decision Graph:-