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HW 9

1)
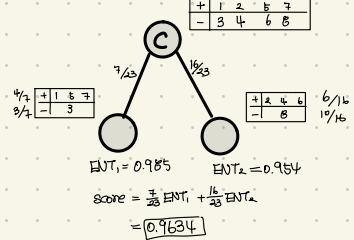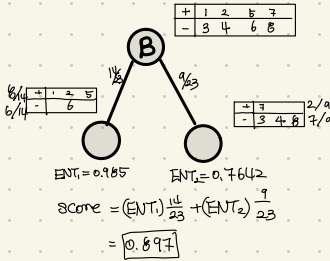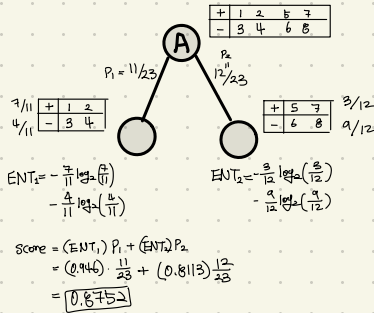
Example	Input Attributes			Class	#
	A	B	C	D	
x_1	T	T	T	Yes	1
x_2	T	T	T	Yes	6
x_3	T	T	F	No	3
x_4	T	F	F	No	1
x_5	F	T	T	Yes	1
x_6	F	F	T	No	6
x_7	F	T	T	Yes	2
x_8	F	F	T	No	3

To decide the first node (root), we should compare entropy to have better attribute.
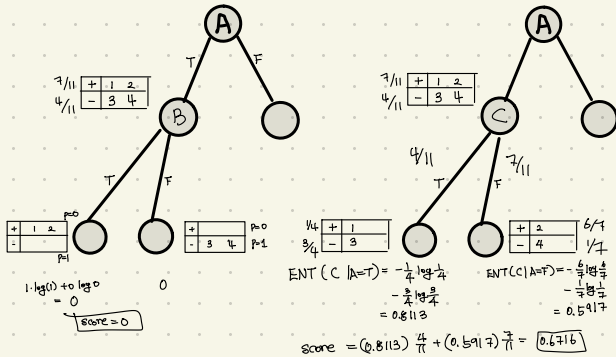
m a node.

✓ when root is A   ✓ When root is B   ✓ When root is C

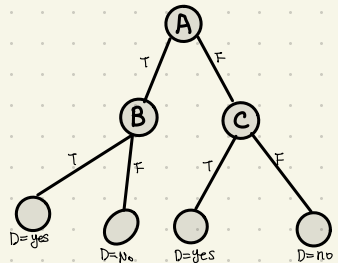When root is with the attribute (a), its score is the smallest. So it should be (A)

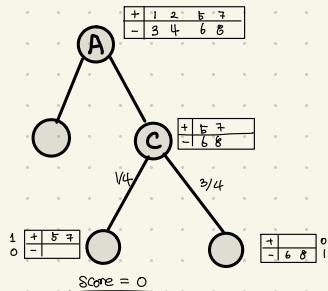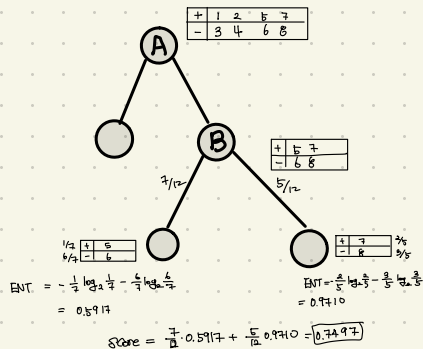So the left child from (A) is (B)

Since the score is 0
So that the right child node of (A) is (C)

So that the final result is

2)

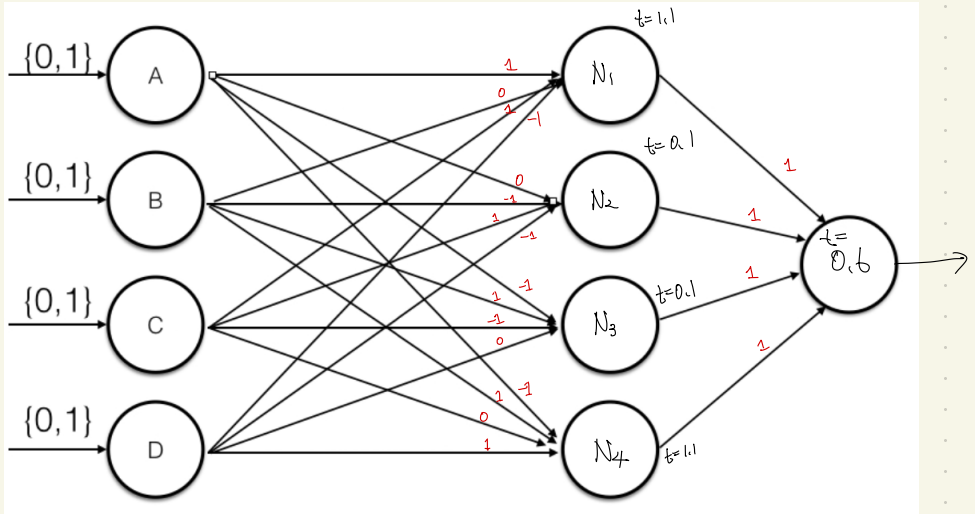$\underbrace{(A \vee \neg B)}_{X} \oplus \underbrace{(\neg C \vee D)}_{Y}$

$X \oplus Y = (X \wedge \neg Y) \vee (\neg X \wedge Y)$

$\quad\quad = ((A \vee \neg B) \wedge (C \wedge \neg D)) \vee ((\neg A \wedge B) \wedge (\neg C \vee D))$

$\quad\quad = \underbrace{(A \wedge C \wedge \neg D)}_{N_1} \vee \underbrace{(\neg B \wedge C \wedge \neg D)}_{N_2} \vee \underbrace{(\neg A \wedge B \wedge \neg C)}_{N_3} \vee \underbrace{(\neg A \wedge B \wedge D)}_{N_4}$

N_1 if $D=0$, $1+1+0+0=2$ so t can be $\boxed{1.1}$
     if $D=1$, $1+1+0+(-1)=1$

N_2 if $D=0$ & $B=0$ 1
      $D=1$ & $B=1$ -1 So t can be $\boxed{0.1}$
      $D=1$ & $B=0$ 0
      $D=0$ & $B=1$ 0

N_3 if $A=0$ & $C=0$ 1
      $A=1$ & $C=1$ -1 So t can be $\boxed{0.1}$
      $A=1$ & $C=0$ 0
      $A=0$ & $C=1$ 0

N_4 if $A=0$ 2 So t can be $\boxed{1.1}$
     if $A=1$ 1

to satisfy output (t), $\dfrac{1.1 + 1.1 + 0.1 + 0.1}{4} = \boxed{0.6}$
           node