age	income	student	credit_rating	buys_computer
<=30	high	no	fair	no
<=30	high	no	excellent	no
3140	high	no	fair	yes
>40	medium	no	fair	yes
>40	low	yes	fair	yes
>40	low	yes	excellent	no
814	loy	/ S	c xy a lent	
	Ledium	no	fair	no
<=30	low	yes	fair	yes
>40	medium	yes	fair	yes
<=30	medium	yes	excellent	yes
3140	medium	no	excellent	yes
3140	high	yes	fair	yes
>40	medium	no	excellent	no

Into (D) =
$$I(3,4)$$
 = $-\frac{3}{12}\log_{2}(\frac{3}{12})$ - $\frac{7}{12}\log_{2}(\frac{7}{12})$ = $\log_{2}(2)$ - $\frac{3}{2}3$ ≈ 0.9183
Info $\log_{2}(D)$ = $\frac{4}{12}I(\frac{3}{2},\frac{3}{2})$ + $\frac{3}{12}I(0,0)$ + $\frac{7}{12}I(3,2)$

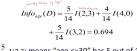
age	p _i	n _i	I(p _i , n _i)
<=30	2	1	1
3140	3	0	
>40	3	a	

$$Info_{250}(D) = I(3,2) = -\frac{3}{4} log(\frac{3}{4}) - \frac{2}{4} log(\frac{3}{4}) = 1$$

$$Info_{250}(D) = I(3,0) = -\frac{3}{5} log(\frac{3}{5}) - \frac{5}{5} log(\frac{3}{5}) = 0$$

$$Info_{240}(D) = I(3,2) = -\frac{3}{5} log(\frac{3}{5}) - \frac{2}{5} log(\frac{3}{5}) = 0$$

$$Info_{240}(D) = I(3,2) = -\frac{3}{5} log(\frac{3}{5}) - \frac{2}{5} log(\frac{3}{5}) = 0$$



 $\frac{5}{14}I(2,3)$ means "age <=30" has 5 out of 14 samples, with 2 yes'es and 3 no's.

 $Gain(age) = Info(D) - Info_{age}(D) = 0.246$ Similarly, we can get Gain(income) = 0.029

Gain(income) = 0.029 Gain(student) = 0.151 $Gain(credit_rating) = 0.048$