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1.

(a) T (b) F (c) F (d) F (e) F

(f) T (g) T (h) F (i) F (j) T

2.

(a) $P(\text{male}) = 51\%$ $P(\text{female}) = 49\%$

(b)

$$P(\text{male}|\text{smoke}) = \frac{P(\text{smoke}|\text{male}) P(\text{male})}{P(\text{smoke})}$$

$$= \frac{10\% \cdot 51\%}{51\% \cdot 10\% + 49\% \cdot 2\%}$$

$$= 0.83882$$

3.

(a) $GINI = 1 - \sum [p(j|t)]^2$

$GINI_{one} = 1 - \left(\frac{2}{100}\right)^2 - \left(\frac{98}{100}\right)^2$

$= 0.0392$

$GINI_{two} = 1 - \left(\frac{57}{100}\right)^2 - \left(\frac{43}{100}\right)^2$

$= 0.4902$

$GINI_{three} = 1 - \left(\frac{75}{100}\right)^2 - \left(\frac{25}{100}\right)^2$

$= 0.375$

(b) $Cross\ entropy = -\sum p(j|t) \log p(j|t)$

$CE_{one} = -\frac{2}{100}\log\frac{2}{100} - \frac{98}{100}\log\frac{98}{100}$

$= 0.1414$

$CE_{two} = -\frac{57}{100}\log\frac{57}{100} - \frac{43}{100}\log\frac{43}{100}$

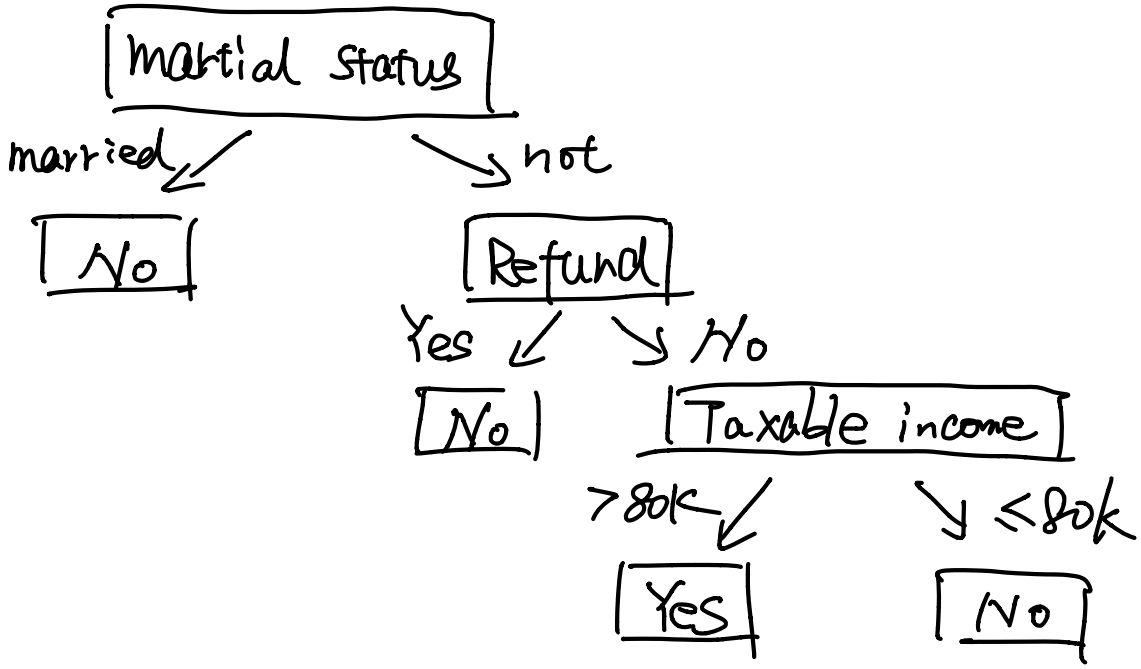
$= 0.9858$

$CE_{three} = -\frac{75}{100}\log\frac{75}{100} - \frac{25}{100}\log\frac{25}{100}$

$= 0.8113$

4

(a)



(b)

index 1 : Cheat No

index 2 : Cheat No

5.

(a) $L(\mu|x) = \mu^{x_1}(1-\mu)^{1-x_1} \cdots \mu^{x_N}(1-\mu)^{1-x_N}$

$= \mu^{x_1}\mu^{x_2}\cdots\mu^{x_N}\,(1-\mu)^{1-x_1}(1-\mu)^{1-x_2}\cdots(1-\mu)^{1-x_N}$

$= \mu^{(x_1+x_2+\cdots+x_N)}(1-\mu)^{(N-x_1-x_2-\cdots-x_N)}$

(b)

$l(\mu|x) = \ln L(\mu|x)$

$= \ln\mu\left(\sum_{i=1}^{N} x_i\right) + \ln(1-\mu)\left(N - \sum_{i=1}^{N} x_i\right)$

$= N\bar{x}\ln\mu + (1-\bar{x})\ln(1-\mu))$

(c)

$$\frac{\partial l(\mu|x)}{\partial \mu} = N\frac{\bar{x}-\mu}{\mu(1-\mu)}$$

$$\mu^{*} = \bar{x}$$