

1. The **entropy** $H(X)$ of an event is

$$\sum_{i=1}^n p(x_i) \log_2 \frac{1}{p(x_i)}$$

Ans a

2. Given a source with 16 equiprobable symbols. Therefore, $16p = 1 \Rightarrow p = \frac{1}{16}$. Its entropy is

$$16 \times \frac{1}{16} \times \log_2 \frac{1}{1/16} = \log_2 16 = 4$$

Ans c

3. The entropy $H(X)$ of the final yes/ no decision for the given example is

$$H(X) = H\left(\frac{1}{2}, \frac{1}{2}\right) = 1$$

1	3	4	6	8	12
2	5	7	9	10	11

Ans b

4. The **conditional entropy** $H(X|Y)$ is defined as

$$\sum_{j=1}^m p(y_j) H(X|Y = y_j)$$

Ans c

5. To construct the decision tree classifier (DTC), one has to choose the **feature** that maximizes the **information gain**

Ans b

6. The information gain is defined as

$$IG(X|Y) = H(X) - H(X|Y)$$

Ans a

7. The conditional entropy for the type feature depicted in the figure is

$$\begin{aligned} & H(X|TYPE) \\ &= P(\text{Fr}) \times H(X|\text{Fr}) + P(\text{It}) \times H(X|\text{It}) + P(\text{Th}) \times H(X|\text{Th}) + P(\text{Bu}) \times H(X|\text{Bu}) \\ &= \frac{2}{12} \times 1 + \frac{2}{12} \times 1 + \frac{4}{12} \times 1 + \frac{4}{12} \times 1 \\ &= 1 \end{aligned}$$

Ans d

8. As described in the lectures information gain for the type feature equals 0

Ans d

9. Decision tree classifier is imported in PYTHON as
from sklearn.tree import DecisionTreeClassifier

Ans a

10. Which of the follow is not a type of IRIS flower

Azoricum

Ans c