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1. You have trained a decision tree on a dataset and observe, Training accuracy = 100%, Test accuracy = 68%. The tree has a depth of 15, and many leaf nodes have only 1 or 2 samples. Explain why this model is likely overfitting. Suggest ways to reduce overfitting and justify each in the context of decision trees. [5]

2. You are given a small dataset with 6 samples:

Feature W	Class
Red	Yes
Red	No
Red	No
Blue	Yes
Blue	Yes
Blue	Yes

- (a) What is the entropy of the entire dataset before splitting?
- (b) What is the entropy after splitting on **Feature W**?
- (c) What is the **Information Gain** from splitting on Feature W?

[5]