**a) Algorithm Performance:**

***• Which dataset achieved the highest accuracy and why?***

The Mushroom dataset achieved the highest accuracy because its features, such as cap shape, odor, and gill colour, are very effective at predicting whether a mushroom is edible.

***• How does dataset size affect performance?***

Larger datasets take more time to train but are better at capturing patterns. Smaller datasets might lead to overfitting.

***• What role does the number of features play?***

Adding more features can improve accuracy, but irrelevant features can create noise and make analysis difficult.

**b)Data Characteristics Impact:**

***• How does class imbalance affect tree construction?***

If one class is larger than the other, the decision tree might become biased, making it harder to analyse.

***•Which types of features (binary vs multi-valued) work better?***

Multi-valued features worked better.

**c) Practical Applications:**

***• For which real-world scenarios is each dataset type most relevant?***

The mushroom dataset can be used for agriculture and food safety. The Tic-Tac-Toe dataset can be used for strategy prediction. The Nursery dataset can be used to make decisions in a school environment.

***•What are the interpretability advantages for each domain?***

The mushroom dataset is simple and easy to interpret. The Tic-Tac-Toe dataset uses binary values (win/lose). The Nursery dataset is more complex, but demonstrates how a decision tree can be created from multiple attributes.

***• How would you improve performance for each dataset?***

In the mushroom dataset, pruning could reduce class imbalance. In the Tic-Tac-Toe dataset, overfitting can be reduced by pruning. In the Nursery dataset, choosing only relevant and required attributes would improve performance.