Decision Tree Classifier Results

- **The decision tree was trained using Gini impurity for splitting.**

- **The best split was found on Income at a threshold of 0.5.**

- **Prediction for (Age=42, Income=Low, Student=No, Credit=Excellent): Yes**

Bagging and Random Forest Results

- **Bagged Trees Prediction: Yes**

- **Random Forest Prediction: Yes**

- **Out-of-Bag (OOB) Error for Bagging:** `0.42857142857142855`

- **Out-of-Bag (OOB) Error for Random Forest: 0.375**

Q5: Polynomial Regression with Cross-Validation

Cross-Validation Results

- **The model was tested with different polynomial degrees, and cross-validation errors were recorded:**

    - **Degree 1: 0.2114**

    - **Degree 2: 0.2015**

    - **Degree 3: 0.0135 (Best)**

    - **Degree 4: 0.0140**

- **Optimal Polynomial Degree: 3**

- **Lowest Cross-Validation Error: 0.0135**
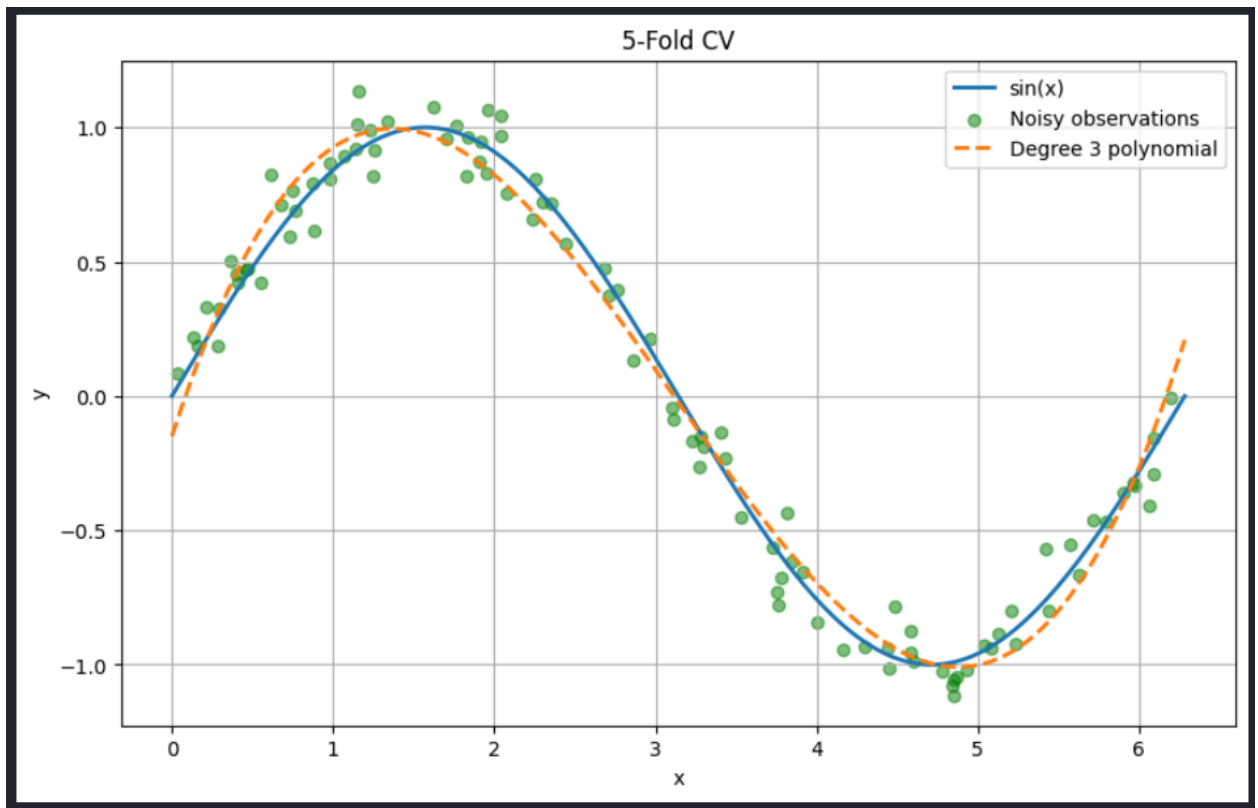
- **The graph includes:**

    - **The true function: y=sin(x)y = \sin(x)y=sin(x)**

    - **Noisy training points to simulate real-world imperfections.**

    - **The polynomial regression model's predictions, which closely fit the true function for the best degree.**