**Heart Failure Readmission Prediction: Testing Documentation**

**1)Manual Test Cases**

**Requirement 1**: Develop a Machine Learning Model

Objective: Build and validate a machine learning model for predicting readmission of heart failure patients.

Test Cases:

* Input Validation:

TC-M1: Verify the model's handling of invalid age inputs.

Input: Age = -5

Expected Result: Proper error handling or validation message.

TC-M2: Test with missing or incomplete input data.

Input: Missing ethnicity and marital status.

Expected Result: Ensure model handles missing values appropriately.

* Model Functionality:

TC-M3: Validate model predictions with typical patient profiles.

Input: Age = 65, ethnicity = 'WHITE', marital status = 'MARRIED', admission type = 'EMERGENCY', gender = 'M'

Expected Result: Model predicts readmission necessity as 'YES'.

TC-M4: Test edge cases for age.

Input: Age = 100

Expected Result: Ensure model accurately predicts readmission based on extreme age.

**Requirement 2:** Detailed Data Analysis

Objective: Perform comprehensive data analysis to support model development.

Test Cases:

* Data Exploration:

TC-M5: Analyze distribution of readmissions across different age groups.

Expected Result: Visualize readmission rates across age demographics.

TC-M6: Conduct correlation analysis between length of stay and readmission likelihood.

Expected Result: Determine if longer stays correlate with higher readmission rates.

* Feature Engineering:

TC-M7: Validate encoded features against dataset requirements.

Expected Result: Ensure proper encoding of categorical variables.

**Requirement 3:** Decision on Tables to Use

Objective: Select appropriate tables from MIMIC-III dataset for model training and testing.

Test Cases:

* Data Source Decision:

TC-M8: Compare impact of using different tables (e.g., admission, diagnosis) on model performance.

Expected Result: Evaluate which tables contribute most to predictive accuracy.

**Requirement 4:** Link to MIMIC-III Table Descriptions

Objective: Verify accuracy and completeness of table descriptions from MIMIC-III documentation.

Test Cases:

* Table Documentation:

TC-M9: Cross-reference table usage in project with MIMIC-III documentation.

Expected Result: Ensure consistency between implemented tables and MIMIC-III documentation.

**Requirement 5:** Detailed Data Analysis Before Prediction

Objective: Conduct thorough data analysis before model prediction to enhance understanding and insights.

Test Cases:

* Data Visualization:

TC-M10: Generate visualizations (e.g., histograms, scatter plots) for key features like age, length of stay, and readmission.

Expected Result: Visual representation of feature distributions and correlations.