**Use Case Title: Predicting Student Success with Logistic Regression**

**Use Case Overview:**

You are working as a data science instructor helping students understand how logistic regression can be used to predict academic outcomes. The goal is to build a simple logistic regression model that predicts whether a student will pass or fail based on key academic and support factors such as:  
- Study time per week  
- Number of absences  
- Parental support  
  
You are to build a model that performs the following:  
1. Preprocesses the student data from a CSV file (students.csv)  
2. Applies data cleaning, missing value imputation, and outlier detection (UCL/LCL)  
3. Implements logistic regression using core mathematical functions: sigmoid, hypothesis, cost  
4. Predicts the probability of passing for each student and classifies them as pass/fail

**Dataset Details:**

- File Name: students.csv  
- Sample Fields:  
 - StudyTimeWeekly – hours studied per week  
 - Absences – number of classes missed  
 - ParentalSupport – 1 if support available, 0 otherwise  
 - GPA – numeric grade point average  
 - (Optional): name, StudentID

**Functions to Implement in student.py:**

**1. load\_data(file\_path)**

* Load student data from the specified CSV file using pandas.  
  Return the loaded DataFrame.

**2. preprocess\_data(df)**

* Fill missing values for numeric columns with median.  
  Fill missing values for categorical columns with mode.  
  Create a new binary column pass\_fail: 1 if GPA ≥ 3.0, else 0.  
  Drop GPA and StudentID (if exists).  
  Return the preprocessed DataFrame.

**3. calculate\_ucl\_lcl(series)**

* Calculate the Upper Control Limit (UCL) and Lower Control Limit (LCL) using:  
  UCL = mean + 3\*std, LCL = mean - 3\*std  
  Return both UCL and LCL.

**4. sigmoid(z)**

* Apply the sigmoid function: σ(z) = 1 / (1 + e^(-z)).  
  Used to convert weighted sums into probabilities.

**5. hypothesis(X, weights)**

* Compute the hypothesis using sigmoid(dot(X, weights)).  
  Represents probability a student passes.

**6. compute\_cost(X, y, weights)**

* Implement logistic regression cost function (log loss).  
  Return the cost using initial weights.

**7. predict(X, weights)**

* Use hypothesis output to classify student as 'Pass' if probability ≥ 0.5, else 'Fail'.  
  Return list of predictions.