Introduction:
The **ALEKS–Calculus Student Performance Dataset** contains student performance metrics from the **ALEKS (Assessment and Learning in Knowledge Spaces)** placement test and corresponding grades in a **Calculus** course.

Problem Statement:
The study aims to analyze:

- The relationship between math proficiency (ALEKS scores) and success in Calculus.
- Learning gains across mathematical topics through pre-test and post-test results.
- Differences in performance between students from **Mapua SHS** and external institutions.

Exploratory Data Analysis (EDA)

- **Average Mastery per Topic (Initial)**
  - Average topic mastery was computed using the mean of all initial ALEKS topic columns.
  - The analysis visualized mastery distribution per topic via bar charts.
- **Average Mastery per Topic (Post-Test)**
  - Post-test averages revealed overall improvement across most mathematical topics.
  - Graphical results indicated strong mastery in **Polynomial & Rational Functions** and **Systems of Equations & Matrices**.
- **Net Learning Gains**
  - The difference between post-test and pre-test scores showed **positive learning growth** across all topics.
  - The **highest improvement** was observed in **Trigonometric Identities & Equations** and **Conic Sections**.
  - Minor improvements were seen in **Algebra & Geometry Review**, implying a more consistent baseline knowledge.
- **Comparative Analysis**
  - Students from **Mapua SHS** generally achieved higher post-test averages than those from external institutions.
  - This suggests that **prior mathematical training and curriculum exposure** significantly affect ALEKS performance and subsequent Calculus success.

Findings

1. ALEKS post-test mastery positively correlates with higher Calculus grades.
2. Students from Mapua SHS consistently outperformed external students across all topics.
3. Strongest learning improvements occurred in trigonometric and conic-related topics.
4. Topic mastery weights closely predict overall Calculus performance, validating ALEKS as a diagnostic tool.

Conclusion and Recommendations

- **Conclusion:**
  ALEKS mastery levels serve as reliable predictors of Calculus performance. Students showing higher topic mastery in ALEKS tend to excel academically in Calculus.
- **Recommendations:**
  1. Implement ALEKS pre-assessments for incoming Calculus students.
  2. Focus interventions on weak areas, especially **trigonometry** and **conic sections**.
  3. Encourage continuous mastery tracking using ALEKS metrics.
  4. Expand dataset inclusion to more schools for broader validation.