# Project 1: Data Exploration and Visualization

## Dataset 1: Student Academic Performance

This dataset contains information on secondary school students’ academic performance and socio-demographic factors. The dataset provides insights into how different attributes may influence final grades.  
  
Columns:  
- Gender: Male/Female  
- Age: Student’s age (15–22)  
- StudyTime: Weekly study time (in hours)  
- Failures: Number of past class failures  
- Absences: Number of school absences  
- G1, G2, G3: First, second, and final exam grades (0–20 scale)

### Tasks:

1. For each variable (except ID if present), obtain appropriate descriptive statistics (mean, sd, quantiles, etc.) and graphical summaries (bar, histogram, boxplot, scatterplot, etc.).  
2. Examine the relationship of final grade (G3) with age, study time, and absences separately for boys and girls.  
3. Compare grade progression (G1 → G2 → G3) for boys and girls. Are there similarities or differences in trends? Explain.  
4. Discuss any potential insights about how academic and behavioral factors influence student performance.

## Dataset 2: Hospital Patient Readmission

This dataset contains hospital patient records and information on whether patients were readmitted within 30 days. It can help identify risk factors associated with hospital readmissions.  
  
Columns:  
- Age: Patient age (grouped: 0–20, 21–40, 41–60, 61–80, 81+)  
- Gender: Male/Female  
- Length\_of\_Stay: Number of days admitted  
- Num\_Medications: Number of medications prescribed during stay  
- Num\_Diagnoses: Number of diagnoses recorded  
- Readmitted: 1 = Yes, 0 = No

### Tasks:

1. For each variable, compute descriptive statistics (mean, sd, quantiles, etc.) and provide graphical summaries.  
2. Analyze the relationship of readmission with patient age, gender, and number of medications.  
3. Compare the readmission rates across different age groups. Which group is most at risk?  
4. Summarize patterns you observe about patient demographics and hospital utilization in relation to readmission.