Coding Challenge – Credit Risk Analysis & Loan Portfolio Management

Objective

To analyze a bank's loan portfolio to assess credit risk, identify trends, and make recommendations for future lending strategies.

Scenario

You are a data analyst at a medium-sized bank. The bank has provided you with a dataset containing information on a portfolio of consumer loans. Your task is to clean, analyze, and present the data to the bank's loan committee. The goal is to provide a clear picture of the portfolio's health and to forecast the potential impact of different economic scenarios.

Part 1: Data Preparation & Initial Analysis

1. **Data Cleaning:**
    - Start by cleaning the provided dataset. Check for and handle missing values, inconsistencies in data entry (e.g., different formats for dates or loan statuses), and duplicate records.
    - Ensure data types are correct for each column (e.g., numerical for loan amounts, date format for issue dates).
2. **Key Performance Indicators (KPIs) Calculation:**
    - Create new columns to calculate relevant KPIs for each loan. These might include:
        - Loan-to-Value (LTV) ratio.
        - Debt-to-Income (DTI) ratio.
        - Months on Book (the age of the loan).
        - Profit/Loss for each loan.

Part 2: Pivot Table & Visualizations

1. **Pivot Table Creation:**
    - Use **Pivot Tables** to summarize the loan data based on key dimensions. This is where you'll get a high-level view of the portfolio.

- Create a Pivot Table that shows the total funded amount and total number of loans by:
    - Loan Status (Fully Paid, Charged Off, Current).
    - Loan Grade (A, B, C, etc.).
    - Loan Intent (debt consolidation, credit card refinancing, etc.).

2. **Visualizations:**
    - Create **Pivot Charts** based on your Pivot Tables to visually represent your findings.
    - **Monthly Trends:** Use a **line chart** to display the trend of total funded amount and number of loans issued over time. This helps identify periods of high and low lending activity.
    - **Distribution by Loan Grade:** Use a **bar chart** or **pie chart** to show the distribution of loans by their assigned grade.
    - **Geographic Analysis:** If the dataset includes borrower location (e.g., state), use a **filled map chart** to visualize the total loan amount or default rate by state. This can highlight regional risk concentrations.

Part 3: What-If Analysis

This is the most critical part of the challenge, as it requires strategic thinking and the use of Excel's powerful forecasting tools.

1. **Goal Seek Analysis:**
    - The bank has a target for its overall profit margin on loans. Use **Goal Seek** to determine what average interest rate would be needed to achieve a specific profit target, assuming all other variables (e.g., default rate, administrative costs) remain constant.
2. **Scenario Manager:**
    - Create and analyze different economic scenarios using the **Scenario Manager**.
    - **Scenario 1 (Optimistic):** Assume a strong economy with a 5% decrease in the default rate and a 10% increase in the average interest rate for new loans.

- **Scenario 2 (Pessimistic):** Assume a weak economy with a 15% increase in the default rate and a 5% decrease in the average interest rate for new loans.
- Generate a **Scenario Summary report** to compare the potential total profit/loss of the loan portfolio under each of these scenarios. This demonstrates the potential financial impact of different economic conditions.

3. **Data Tables:**
   - Use a **Data Table** to see how the total expected profit of the portfolio changes based on two variables:
     - **Variable 1:** The default rate (e.g., test rates from 5% to 20%).
     - **Variable 2:** The average interest rate (e.g., test rates from 7% to 12%).
   - This will create a grid that shows the expected profit for every combination of these two variables, providing a robust sensitivity analysis.