# **Assignment: Campaign Budget Optimization for Eyewear Retailer**

## **Context**

A national eyewear retailer has been conducting targeted marketing campaigns for its existing customer base, utilizing individual-level response probability scores to guide campaign execution. The CRM Director now seeks analytical support to determine the effectiveness of various campaign strategies and to optimize budget allocation for the upcoming fiscal year.

You are expected to act as a data analyst to evaluate the performance of previous campaigns, determine the factors that drive responses, and design a budget allocation plan to maximize returns from future campaigns.

**Business Constraints and Inputs:**

* Total available campaign budget: USD 2,000,000
* Mailing cost per customer: USD 0.25
* Maximum addressable customer base: 10 million
* Access to campaign-level and customer-level data, including probability scores

## **Assignment Duration**

**Total Duration**: 3 Days  
 **Submission Format**: GitHub repository (details below)

## **Assignment Objectives**

You are required to address the following business questions through a structured data analysis and modeling exercise:

1. Do individual or combinations of campaign factors significantly impact the likelihood of customer response? Can this impact be quantified through modeling?
2. How can probability scores be used to prioritize customers for mailing within different campaign segments (e.g., by product, month, milestone)?
3. What is the optimal way to allocate the upcoming year’s campaign budget of USD 2MM across combinations of product, month, and milestone to maximize customer response, assuming consistent scoring?

## **Tools and Methods**

Participants may use any of the following tools based on preference and familiarity:

* Microsoft Excel or Google Sheets (including Solver for optimization)
* Python (Pandas, Scikit-learn, SHAP, PuLP or Scipy.optimize)
* Power BI or Tableau for visualization and dashboard creation
* SQL (for data manipulation and transformation, if required)

## **Submission Requirements**

Submissions must be organized and presented via a **GitHub repository**, containing the following components:

1. **Presentation Deck** (6–8 slides, PDF or PPTX) summarizing the findings and recommendations
2. **Analytical Code or Workbooks**:  
   * Python Notebooks (.ipynb) or Excel/Power BI files (.xlsx/.pbix)
3. **Dataset** (if synthetic data is used)
4. **README.md** including:  
   * Problem statement and objectives
   * Tools used
   * Step-by-step approach
   * Folder and file structure
   * Instructions to reproduce analysis

## **Assignment Timeline and Breakdown**

### **Day 1: Exploratory Analysis and Modeling**

**Objectives:**

* Conduct exploratory data analysis to evaluate the relationship between campaign attributes (product type, month, milestone) and customer response.
* Build a classification model (e.g., Logistic Regression, Decision Tree, or XGBoost) to quantify feature importance and understand what drives responses.

**Deliverables:**

* EDA summary with supporting charts or insights
* Model interpretation report

### **Day 2: Score-Based Budget Simulation**

**Objectives:**

* Simulate campaign budget allocation by ranking customers using their probability scores.
* Create scenarios with different score thresholds to analyze projected responses and ROI.
* Design a dashboard or spreadsheet for comparison of strategies.

**Deliverables:**

* Campaign segment allocation plan (by product, month, milestone)
* ROI comparison across score thresholds
* Dashboard (Excel or Power BI) or summary tables

### **Day 3: Optimization and Final Recommendations**

**Objectives:**

* Frame the campaign planning challenge as a constrained optimization problem.
* Implement optimization logic using Excel Solver or a Python-based optimization library.
* Create a final presentation outlining key insights, strategy, and expected uplift from the recommended budget allocation.

**Deliverables:**

* Optimization logic with constraints clearly defined
* Recommended allocation plan with rationale
* Final slide deck (6–8 slides) summarizing the full solution