# Methods Assignment 2

## Business Overview

You have been asked to help a retail company in Canada to setup their **customer information** and **sales analysis system**.

Your solution should be as robust (defect free) as possible.

Your source code should be: modular, readable, and use coding standards for the language.

Internal documentation should be provided for methods/functions, and classes.

**At this point, we have completed Part A – Customer Information. We will not be directly integrating this feature into our code base in Part A. Instead, we will be creating this feature in a separate file, with the intention of integrating it at a later time.**

**Sales Analysis system – Part B**

You have also been asked to build a **sales analysis system**.

There are 2 requirements of the sales system. There should be a user option to reading the file containing the total sales amount (**sales.csv")** and there should be an option to check the sales data for possible accounting fraud.

You will perform the accounting fraud task you will validate the sales data using Benford's Law. Benford's law is based on the distribution of the first digits of numeric data. (see description of Benford's law on the next page).

The Sales Analysis system should perform the following tasks:

1. Load the sales data from the input file provided "sales.csv" through a user input.
   1. Note: Unlike the postal code information the delimiter used in this file is a comma (,).
2. Analyze the entire sales data provided to determine if it complies with Benford's law.
   1. The user should see a **numeric and visual representation** of the distribution of first digits from 1 to 9.
   2. If the first digit frequency is between 29% and 32% the system should state that the data indicates that fraud likely did not occur. You can output this result in the terminal
3. Export the digit frequency in the form of a .csv file called “results.csv” into the same directory as the program. These results should report the percentages in a table similar to the graphic provided

You may use any JavaAPI to complete this. Many choose to use JChartFree or JavaFX.

## Benford's Law

Benford's Law is an observable distribution of the first digits.

If the first digit was uniformly distributed from 1 to 9 then the probability of observing a 1 as the first digit is P(x=“1”) = 1/9 or approximately 11%.   
  
Benford observed that with many datasets the digits 1 and 2 occur at a much higher frequency and are not uniformly distributed as might be expected.

As you can see in the distribution table shown here the probability of the first digit of 1 is around 30%.

