CMSC 105 LABORATORY ACTIVITY 1
SIMULATING DIFFERENT TYPES OF SAMPLING TECHNIQUES

Objective: To strengthen knowledge gained in the lecture-discussion of the different types of sampling techniques (simple random sampling, systematic sampling, and stratified sampling techniques) used in getting random sample from a target population through the use of virtual simulation.

Instructions: The exercise should be accomplished in pairs – peer learning approach. You choose your own partner/team-mate in the same lab section where you belong.

To log-in to the shared network storage drive where you will save your program files (executable and source code files), execute the '**Run**' command in Windows and type the following in the next prompt: ' **\\172.17.1.58\[type your Campus ID here]**. Then, click 'OK'. In the next prompt, type your 'Campus ID' again for your password.

Once you access your storage space, create a folder named 'CMSC105'. This is the folder where you save all your submissions for the lab exercises.

To access the 'Faculty Postings' folder where the lab exercises are saved under the CMSC105 sub-folder, execute the '**Run**' command again in Windows and type the following in the next prompt: '\\172.17.1.58\faculty_postings'.

Name your program files as **StudentIDAnsLab1.???** (with file extension depending on type of file your creating - '.EXE' for executable file and '.C' or '.java' for source code file, for example).

EXERCISE 1: Write a program, using a programming language of your choice, which simulates the Simple Random Sampling, Systematic Sampling, and Stratified Sampling Procedures to get a random sample from the target population. The following requirements must be met:

1. Program shows menu where the user chooses a sampling procedure to simulate. The menu heading should be: 'Basic Sampling Methods'. The menu should include a 'Quit' option as the last menu item;
2. Except for the 'Quit' choice, program asks the user to enter the size of the target population (i.e. 'N');
3. Next, the user inputs the sampling frame;
   Sampling frame items could be either numerical or character data, but not both, and should be indexed (from 1 to N).
4. Display (or you may display as you input the sampling frame) the sampling frame using the format below:
   THE SAMPLING FRAME
   Index 1   Index 2 … Index N
   Item1   Item 2 ….. Item N
                                                   (leave line space between rows)
   Index 1   Index 2 … Index N
   Item1   Item 2 ….. Item N
5. For the following user choices:
   5.1. SIMPLE RANDOM SAMPLING
      5.1.1. User specifies the size of the sample (i.e. 'n') to be taken from the target population - *'n' must be less than 'N', and not equal to zero. Default is 20%, rounded-up/ceiling for computed 'n' with decimal values*;
      5.1.2. Program displays the random sample with the order of the sample items presented according to the order they are picked using the same format in #4, except for the heading, this time, 'RANDOM SAMPLE', and the order of items with the corresponding indexes;
   5.2. SYSTEMATIC SAMPLING
      5.2.1. User specifies the size of the sample (i.e. 'n') to be taken from the target population - *'n' must be less than 'N', and not equal to zero or one. Default is 20%, rounded-up/ceiling for computed 'n' with decimal values*;

5.2.2. Compute k, where $k = N/n$;

5.2.3. Select randomly starting point to select sample item from 1 to k;

5.2.4. Pick succeeding kth sample item(s) from previously identified starting point until 'n' sample size is satisfied;

5.3. STRATIFIED SAMPLING

5.3.1. Program sorts/groups similar items in the sampling frame into subgroups/strata, and displays the composition of each strata using the format below:

STRATA 1

Index 1   Index 2 … Index N

Item1   Item 2 ….. Item N

                      (leave line space between rows)

STRATA 2

Index 1   Index 2 … Index N

Item1   Item 2 ….. Item N

                      (leave line space between rows)

STRATA ..M

Index 1   Index 2 … Index N

Item1   Item 2 ….. Item N

5.3.2. Program asks user to specify a percentage (i.e. <100% and ≠0) of the items for each strata to be sampled randomly. *Round-up to the nearest whole number in getting the number of samples for each strata*;

5.3.3. Program displays the random sample per strata/group using the format in #5.3.1, however this time, include a label of the corresponding number of samples for each strata, e.g. STRATA 1 (n = total sample items in strata 1);

5.4. QUIT: Terminate the program. (*For menu choices 5.1-5.3, program control returns to main menu after executing the simulation.*)

NOTE: Implementation of error-catching or user-validation feature(s) is a given as well as 'proper' formatting in user's input and output, i.e. visually appealing.