*Read **all** instructions before beginning your work.*

COMP1200-MATLAB - assign 02
Due 4:45pm – Friday – January 31, 2020
Submit `assign02a.m` and `assign02b.m` **via Canvas**

NOTE:
Your submitted file(s) MUST be spelled and cased as instructed.

You will be instructed to solve a problem in two parts and submit files for each part. This demonstrates how to approach solving a large problem by solving one smaller part at a time. By solving a smaller part correctly before adding the next, one can keep the number of statements and errors that may result from them to a minimum. This approach also demonstrates how an existing problem may change in scope and thus the solution program must be modified. By saving the first part with an incremental file name, additional versions can easily be saved using subsequent names providing a good backup file.

***Before you start writing your program**:*
Read the complete instructions including the **algorithm**. An **algorithm** contains the steps needed to guide you through solving a problem. Use the **algorithm** as comments to a guide you when writing the MATLAB program file solution for the following problem.

***Problem*:**

There are many different payment options when purchasing major goods, such as fl at screen televisions and computers. Payment options include:

- cash
- credit card
- lay-by
- deferred payment
- buying on terms
- loan.

The cost of purchasing an item can vary depending on the method of payment used.
Some methods of payment involve borrowing money and, as such, mean that interest is charged on the money borrowed.
The simple interest formula can be used to calculate the interest charged on borrowed money,

$$I = \frac{P \times r \times T}{100}$$

where: I is the simple interest ($)
P is the principal or amount borrowed or invested ($)
r is the rate of interest per time period
T is the time for which the money is invested or borrowed.
If T is in years, then r is the rate of interest per annum (% p.a.).

NOTE: I, P, r, T are not descriptive variables

Instructions for all assignment scripts:

- ☐ See Standards for Documentation of MATLAB Programs on the Canvas Resources page.
- ☐ Insert comments at the top and throughout each file.
  - o Include the follow comments at the beginning of this (and ALL) files.
    `%` submitter's name, **GROUP # or "none"**
    `%` other group members' names or **"none"**
    `%` **`program file name`**, ex. assign02a.m
    `%` due date of the assignment
    `%` **statement about collaboration REQUIRED.**
    `%` a short narrative about what the file does
  - o Use the algorithm given as comments throughout your program.
- ☐ Observe the instructor's rule for naming variables.
  - o Use ALL CAPS for constants variable names.
  - o Start other variables with lower case.
  - o Use descriptive variable names.
- ☐ Use Sample Input/Output as a guide.
- ☐ Code clarity:
  - o Indent blocks as needed. **Use Smart Indent.**
  - o Divide your solution program code into sections as noted in the algorithm. Use blank lines as needed to group statements.
  - o Use section comments as well as the algorithm step comments.
  - o Remove statements from previous assignments that do not apply to the current requirements.
- ☐ Use comments to show units.
- ☐ **Use the CONSTANT and variable names, not numbers.**
  Exceptions are incrementers (or counters) and numbers without identity.
- ☐ No extra output, i.e. use semicolons

GRADE OF ZERO **for a file if submitter name not part of Canvas group.**

(-3pts) No CURRENT GROUP# or "none".
(-3pts) For your own protection, type "none" for other group members if submitting alone.
(-5pts) Five point penalty for not joining your Canvas group.

(-5pts) Zero points for comments if no collaboration statement.

***Program*: assign02a.m**
Write a MATLAB script file that uses principal (or amount), rate of interest, and time to compute and display the simple interest with appropriate labeling.

***Problem* CONSTANTS:** (with units)
```
PRINCIPAL       4000  % dollars
```

***Problem Inputs*:** (with units)
```
rate of interest        4.75  % percent
time                    4     % years
```

Problem Outputs: (with units)
```
simple interest                 % dollars
```

Other variables: (with units)
none

Equation:
See above.

Algorithm: See `green` comments below.
Type the `green` comments as given in the editor window and use as a guide for typing the MATLAB statements.

Run output:
```
Simple interest ($):            Some rounding differences allowed
        760.00 :                .
```

NO error checking.
Do not use commands and statements beyond what has been taught on class.
Do not use commands and statements in assign01 until they have been discussed in class.

New commands:
`format bank, loose`
`disp()`
Use descriptive variables.

Start your program file by typing the following into your empty editor window.

- Type yours/your group and other required information comments.
- Type the algorithm as given below as comments to guide you when writing the MATLAB instructions to do the tasks to solve the given problem.
- Below the comment, type the MATLAB statement(s) that do what the comment says. This example should help. →

```
% submitter's name, GROUP # or none
% other group members' names or none
% program file name
% due date of the assignment
% statement(s) about collaboration. See syllabus for examples.
% a short narrative about what the file does

clc, clear all
format long
format loose

% ***** CONSTANTS *****
% get principle

% ***** INPUT *****
% get interest rate and time

% ***** COMPUTE *****
% compute simple interest ($)

% ***** OUTPUT *****
% display simple interest with label
```

A sample program
The algorithm was added as comments to guide you when writing the MATLAB program file solution for the problem.

A letter is not a descriptive name, but in this equation a, b, c are commonly used as quad equation coefficients.

```
clc, clear all
format short

%*****INPUT*****
% Get coefficients
a = 1;   % 1st coefficient
b = 3;   % 2nd coefficient
c = -10; % 3rd coefficient

%*****COMPUTE*****
% Calculate the roots
root1 = (-b + sqrt(b^TWO - FOUR*a*c)) /(TWO*a);
root2 = (-b - sqrt(b^TWO - FOUR*a*c)) /(TWO*a);

%*****OUTPUT*****
% Display coefficients and roots
disp('Given coefficients:')
disp(a)
disp(b)
disp(c)
disp('The real roots are:')
disp(root1)
disp(root2)
```

***Program*: assign02b.m**
Write a MATLAB script file that uses principal (or amount), rate of interest, and time to compute and display the simple interest with appropriate labeling. I suggest that you open your assign02a.m, save it as assign02b.m, and carefully make the necessary changes that are required by assign02b requirements.

***Problem* CONSTANTS:** (with units)
PRINCIPAL 4000 % dollars

***Problem Inputs*:** (with units)
Vector of rates of interest: four rates starting with 4 and ending with 5 % percent
time 4 % years

Problem Outputs: (with units)
simple interest % dollars

Other variables: (with units)
None

Equation:
See above.

Algorithm: See green comments below.
Type the green comments as given in the editor window and
use as a guide for typing the MATLAB statements.
The algorithm for assign02b.m is the same as for assign02a.m

Run output:

Rate(%)	Interest($)
4.00	640.00
4.33	693.33
4.67	746.67
5.00	800.00

Some rounding differences allowed

Start your program file by typing the following into your empty editor window.

- Type yours/your group and other required information comments.
- Type the algorithm as given below as comments
  to guide you when writing the MATLAB instructions
  to do the tasks to solve the given problem.

Below a comment type the MATLAB statement(s) do what the comment says.

```
% submitter's name, GROUP #
% other group members' names
% program file name
% due date of the assignment
% statement(s) about collaboration
% a short narrative about what the file does

clc, clear all
format bank
format compact

% ***** CONSTANTS *****
% get principle

% ***** INPUT *****
% get interest rate and time

% ***** COMPUTE *****
% compute simple interest ($)

% ***** OUTPUT *****
% display simple interest with label
```

Notice that the algorithm for a and b are the same. Changing to a vector for rate from a scalar is still getting the interest rate.

NO error checking.
Do not use commands and statements beyond what has been taught on class.
Do not use commands and statements in assign01 until they have been discussed in class.

New commands:
`format bank, compact`
`linspace()`
Compute with vector.
Use a **dot** with operators as needed.
Build a table from input and output vectors.
See text 5ed Ex 3.1 p. 71
`disp()` column headers
`disp()` table
Use descriptive variables.

Submit via Canvas:
`assign02a.m` MATLAB script file
`assign02b.m` MATLAB script file

NOTE: Your submitted file(s) MUST be spelled and cased as instructed.

One submission per group. Canvas links members to files and rubric.

A script cannot run from Canvas. It must be downloaded, saved, and "run".