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

COMP1200-MATLAB - assign 03
Due 4:45pm – Friday – February 7, 2020
Submit `assign03a.m` and `assign03b.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*: assign03a.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. Create a vector of rates using the following information entered from user. Ask the user to enter the low and high values for the rate range and the number of rates. Ask the user for the number of years.

***Problem* CONSTANTS:** (with units)
PRINCIPAL 4000 % dollars
***Problem Inputs*:** (with units)
vector of rates of interest using information entered by user % percent
time entered by user % years
Problem Outputs: (with units)
simple interest % dollars
average rate of interest and simple interest % percent
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:
See below.

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
  o 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

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:
`input()`
`mean()`
Continue:
Create rate vector using `linspace()`
`format bank, compact`
`disp()`
Use descriptive variables.

```
clc, clear all
format bank
format compact

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

% ***** INPUT *****
% get interest rate per period range and time from the user

% create rate vector

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

% create a table with rate and simple interest

% get the average rate and interest

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

% display average rate and interest with label
```

Sample output: **2 separate runs**

Run #1

```
Enter the low value for the rate range: 4
Enter the high value for the rate range: 5
Enter the number of rate values. This includes high and low values: 4
Enter number of years: 4
         Rate(%)    Interest($)
          4.00        640.00
          4.33        693.33
          4.67        746.67
          5.00        800.00

Average: Rate(%)    Interest($)
          4.50        720.00
```

Some rounding differences allowed

Blank line here

Run #2

```
Enter the low value for the rate range: 3.75
Enter the high value for the rate range: 5
Enter the number of rate values. This includes high and low values: 7
Enter number of years: 8
         Rate(%)    Interest($)
          3.75       1200.00
          3.96       1266.67
          4.17       1333.33
          4.38       1400.00
          4.58       1466.67
          4.79       1533.33
          5.00       1600.00

Average: Rate(%)    Interest($)
          4.38       1400.00
```

Some rounding differences allowed

Blank line here

***Program*: assign03b.m**

Modify assign03a to create the rate vector using colon notation. Ask the user for the information needed to create the vector.

***Problem* CONSTANTS:** (with units)

```
PRINCIPAL        4000                % dollars
```

***Problem Inputs*:** (with units)

vector of rates of interest using information entered by user `% percent`

time entered by user `% years`

Problem Outputs: (with units)

simple interest `% dollars`

average rate of interest and simple interest `% percent`

Other variables: (with units)

None

Equation:

See above.

Algorithm:.

The algorithm for assign03b.m is the **same as for assign03a.m**

Sample output: **2 separate runs**

Run #1

```
Enter the low value for the rate range: 4
Enter the maximum value for the rate range: 5
Enter the increment between rates: .25
Enter number of years: 4
         Rate(%)    Interest($)
          4.00        640.00
          4.25        680.00
          4.50        720.00
          4.75        760.00
          5.00        800.00

Average: Rate(%)    Interest($)
          4.50        720.00
```

Some rounding differences allowed

Blank line here

Run #2

```
Enter the low value for the rate range: 3.75
Enter the maximum value for the rate range: 5
Enter the increment between rates: .33
Enter number of years: 6
         Rate(%)    Interest($)
          3.75        900.00
          4.08        979.20
          4.41       1058.40
          4.74       1137.60

Average: Rate(%)    Interest($)
          4.25       1018.80
```

Some rounding differences allowed

Blank line here

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:
create rate vector using colon notation

Continue:

```
format bank, compact
disp()
```

Use descriptive variables.

Submit via Canvas:

`assign03a.m`	MATLAB script file
`assign03b.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".