

# 4a

```
% J Hundley
% assign04a.m
% Given principal or amount and time
% Computer simple interest for multiple interest rates
% Ask use for interest rate range information and number of years
% continue only if user's rate is within range
clc, clear all
format bank
format compact

% ***** INPUT *****
% get interest rate range and rate within range from the user
lowRate = input( 'Enter the low value for the rate range: ' );
highRate = input( 'Enter the maximum value for the rate range: ' );
rate = input( ['Enter rate of interest ' num2str(lowRate) '-' num2str(highRate) '%
inclusive: ']); % percent

% if is not within the rate range display message and end execution
if rate < lowRate || rate > highRate
    disp( 'Rate is out of acceptable range' )
else
    % rate is good continue
    % get principle and time
    principle = input( 'Enter amount of loan: ' ); % dollars
    time = input( 'Enter number of years: ' ); % years

    % ***** COMPUTE *****
    % compute simple interest ($)
    simpleInterest = ( principle .* rate .* time ) ./ 100;

    % ***** OUTPUT *****
    % display principle, time, rate and interest with labels on same line
    disp( ' ' )
    disp( 'Loan summary:' )
    disp( [ ' Principle:      '$' num2str(principle) ] )
    disp( [ ' Interest rate:  ' num2str(rate) '%' ] )
    disp( [ ' Time:          ' num2str(time) ' years' ] )
    disp( [ ' Simple interest: '$' num2str(simpleInterest) ] )
end
```

# 4b

```
% J Hundley
% assign04b.m
% Given principal or amount and time
% Computer simple interest for multiple interest rates
% Ask use for interest rate range information and number of years
% re-ask until user's rate is within range
clc, clear all
format bank
format compact

% ***** INPUT *****
% get interest rate range and rate within range from the user
lowRate = input( 'Enter the low value for the rate range: ' );
highRate = input( 'Enter the maximum value for the rate range: ' );

% re-ask until within the rate range
rate = -1;
while rate < lowRate || rate > highRate
    rate = input( ['Enter rate of interest ' num2str(lowRate) '-' num2str(highRate) '%
inclusive: ']);    % percent
end

% get principle and time
principle = input( 'Enter amount of loan: ' );    % dollars
time      = input( 'Enter number of years: ' );    % years

% ***** COMPUTE *****
% compute simple interest ($)
simpleInterest = ( principle .* rate .* time ) ./ 100;

% ***** OUTPUT *****
% display principle, time, rate and interest with labels on same line
disp( ' ' )
disp( 'Loan summary:' )
disp( [ ' Principle:      '$' num2str(principle) ] )
disp( [ ' Interest rate:  ' num2str(rate) '%' ] )
disp( [ ' Time:          ' num2str(time) ' years' ] )
disp( [ ' Simple interest: '$' num2str(simpleInterest) ] )
```

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

COMP1200-MATLAB – assign04  
Due 4:45pm – Friday – February 14, 2020  
Submit assign04a.m and assign04b.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 flat 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: assign04a.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. Ask the user to enter the rate within requested range; continue ONLY if rate is within range. Ask the user for the principle amount and number of years.

**Problem CONSTANTS:** (with units)  
none

**Problem Inputs:** (with units)  
principle entered by user % dollars  
interest rate entered by user % percent  
time entered by user % years

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

**Other variables:** (with units)  
minimum and maximum rates % percent

**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
```

```
clc, clear all
format bank
format compact
```

```
% ***** INPUT *****
% ask user to enter the minimum and maximum interest rates

% ask user to enter interest rate range and rate within range

% if rate not within the rate range, display message and end execution

% rate is good
% get principle and time

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

% ***** OUTPUT *****
% display principle, time, rate and interest with labels on same line
```

**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:**

```
if...else to check for error
relational, logical operators
num2str()
```

**Continue:**

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

**ZERO POINTS for**

**variables if instructor rules not followed and code clarity if instructions are not followed.**

**See rubric.**

## 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 rate of interest 4-5% inclusive: 5
Enter amount of loan: 4000
Enter number of years: 4
```

Loan summary:

```
Principle:      $4000
Interest rate:   5%
Time:           4 years
Simple interest: $800
```

Build a character string that includes num2str to convert numbers that string

Blank line here

Words and numbers on same line

### Run #2

```
Enter the low value for the rate range: 3.75
Enter the maximum value for the rate range: 5
Enter rate of interest 3.75-5% inclusive: 3
Rate is out of acceptable range
```

### Program: assign04b.m

Modify assign04a to re-ask used for a rate if is not within range.

Remove or modify statements and comments not relevant to current requirements.

**Problem CONSTANTS:** (with units) Same as assign04a

**Problem Inputs:** (with units)

**Problem Outputs:** (with units)

**Other variables:** (with units)

**Equation:**

**Algorithm:**

### Sample output:

```
Enter the low value for the rate range: 4
Enter the maximum value for the rate range: 5
Enter rate of interest 4-5% inclusive: 6
Enter rate of interest 4-5% inclusive: 1
Enter rate of interest 4-5% inclusive: 4
Enter amount of loan: 4000
Enter number of years: 4
```

Loan summary:

```
Principle:      $4000
Interest rate:   4%
Time:           4 years
Simple interest: $640
```

**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:**

while data validation loop

**Continue:**

relational, logical operators

num2str()

format bank, compact

disp()

Use descriptive variables.

### Submit via Canvas:

assign04a.m MATLAB script file

assign04b.m MATLAB script file

**Exam01 Feb. 19**  
**See Exam information page.**

**Cutoff for Visit Dr. Hundley**  
**11:45, Feb. 13**

**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".**