Problem 1

The velocity v of a falling parachutist is given by

$$v = \frac{gm}{c}\left(1 - e^{-(c/m)t}\right)$$

where g = 9.8 m/s^2. For a parachutist with a drag coefficient c = 15 kg/s, compute the mass m so that the velocity is v = 35 m/s at t = 9 s.
By using
(a) bisection
and (b) false position.

For (a) and (b) use initial guesses from the ***user input***, and iterate until the approximate error falls below ***user specified tolerance***.

At first, print the value of m and f(m) from user lower input and user upper input, increasing by 0.1. Then, If the root finding is possible, print the solution, otherwise print no root is possible. You also need to print the following table in your console view.

iteration	Upper value	Lower value	X$_m$	f(X$_m$)	Relative approximate error

Lastly,
Draw six graphs from above solution.
In graph 1: the graph of x_m and relative approximation error (bisection).
In graph 2: the graph of no of iteration and relative approximation error (bisection).
In graph 3: the graph of x_r and relative approximation error (false position).
In graph 4: the graph of no of iteration and relative approximation error (false position).
In graph 5: Compare the relative approximate error with respect to number of iteration between the bisection method and false position method. For comparison, you need to draw the graph of number of iteration and relative approximation error.
In graph 6: Compare the relative approximate error with respect to *x* between the bisection method and false position method. For comparison, you need to draw the graph of *x* and relative approximation error.

Problem 2

Write a single program (**source file name must be** problem2. extension) to solve the following

(a) Use the Newton-Raphson method to determine a root of $f(x) = -x^2 + 1.8x + 2.5$ using $x_0 = 5$. Perform the computation until εa is less than user specified tolerance.
Also perform an error check of your final answer as the following table.

(b) Use the Newton-Raphson method to find the root of
$f(x) = e^{-0.5x}(4 - x) - 2$
Employ initial guesses of (i) 2, (ii) 6, and (iii) 8. Explain your results.

You also need to print the following table in your console view.

iteration	x_i	$f(x_i)$	$f'(x_i)$	Relative approximate error

Problem 3

Write a single program (**source file name must be** problem3. extension) to solve the following

(a) Consider following easily differentiable function,
$f(x) = 8\sin(x)e^{-x} - 1$:
Use the secant method, when initial guesses of $x_{i-1} = 0.5$ and $x_i = 0.4$ with user specified tolerance.

You also need to print the following table in your console view.

iteration	Upper value	Lower value	X_m	$f(X_m)$	Relative approximate error

Submission:

Deadline: 16th September, 2018 11:59 PM

Bring the ***hard copy*** of the assignment with the following format (supplied before)

Sample:

01. Name of the assignment: (Example: Bisection Method/ Newton Raphson Method/ etc …)
02. Submitted by: (Your name, your roll)
03. Problem statement and Solution
    Example:

    Problem Statement-1,2,...n:

    which functions was given to evaluate, you only need to provide the functions and their parameters

    Solution-1,2,...n:
    Your solution (programs) for Problem statements-1,2,...n

04. Sample Input/Output

    Snapshot of your console view

05. Graphs

    Snapshot of your graphs along with the proper axis notations (if applicable)