ECE 431 - Computer Programming
Groups EE2413B, EE2413C, EE2413H, EE2422B

Assignment 1 (28th March 2016)

Instructions:
1. Answer all questions. Do this work in groups of 2. Clearly indicate your particulars on the front page of your work.
2. All programs must be properly indented and commented. Use A4 size paper with double sided printing. Do not bind the assignment in any way, just staple it on the top left hand corner.
3. At least 3 results of the program execution must be provided (where appropriate). Please submit anytime between 4th to 8th April 2016.
4. Failing to comply with these rules will result in severe penalty.

1. Given a series RC circuit as shown. Write a program that calculate the time taken for the capacitor to be 90%, 95% and 99% charged. The capacitor is not charged initially. The battery V is a 12V battery, resistor R is 1.50KΩ and capacitor C is 47μF. The formula to calculate the voltage across the capacitor C is given below.

\[ V_c = V \left( 1 - e^{-\frac{t}{RC}} \right) \]

Give your answer in a suitable table form.
http://www.electronics-tutorials.ws/rc/rc_1.html

2. Write a menu driven program using a switch...case construct that convert:
   a) A decimal number to a 2-digit hexadecimal number
   b) A 2-digit hexadecimal number to decimal number

   The user will choose the conversion type and then enter the appropriate value for conversion.
http://programmingknowledgeblog.blogspot.my/2013/05/c-program-for-converting-decimals-to.html

3. Using the Newton’s iteration method, write a program to calculate the root of the equation
   \[ x^4 - 56 = 0 \]. Newton’s formula is:
   \[ x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)} \]

   where \( f'(x_i) \) is the derivative of function \( f(x) \) evaluated at \( x=x_i \). The program display the equation and ask the user to enter a guess for the value of \( x \). The program then plots the roots from the guessed value until it converges to the final answer in table form with the total number of iterations. Use while loop for the iteration process.
http://www.youtube.com/watch?v=1uN8cBGVpfs