ENGN4213/6213 Digital Systems and Microprocessors

Tutorial 5

Question 1: Arithmetic and C Refresher

The C programming language represents signed integers internally in a form called two's-complement.

1. What number is represented by the binary 11011010 when interpreted as
    a. An 8-bit signed integer
    b. An 8-bit unsigned integer
    c. A 16-bit signed integer
2. What's the 8-bit hexadecimal representation of the number -120
3. What's the value of 'c' after each of the following computations:

```
int a = 5; int b = 28;
int c; unsigned char d;
```

a. `c = a + b;`
b. `c = a | b;`
c. `c = a ^ b;`

```
int e=73; int f=192;
```

d. `d = e + f; c = d + 1;`
e. `c = 3; for (d = 0; d < 300; d++) c++;`

Question 2: Basic I/O

Write a program which will ask you about your first name, student number and a radius of units of length (a float) and print the name and student number on separate lines together with some remarks of your choice (e.g., Your first name …… is stored.). Also print out the area of a circle of the input radius. Assume that the value of pi is 3.14159. Your output for this should take the form: "The area of a circle of radius ... units is ..... units." If you want to be clever, and have looked ahead in the notes, print the message "Error: Negative values not permitted." if the input value is negative.

You may use either several printf instructions, each with a newline character in it, or one printf with several newlines in the control string.

Question 3: Arrays & Strings

Write a program to read in 5 numbers and compute the average, maximum and minimum values. Finally, sort them in order to get an output something like:
(*hint for printing to screen: just as \n means a new line, \t introduces a tabulation*)

You entered	The sorted list is
10	1
15	2
2	10
1	15
43	43

Question 4: Function

Write a program to calculate the factorial of an integer number using recursion. Remember that 3!=3*2*1=6 and 0!=1. Create suitably explanatory inputs and outputs.