

# Homework Assignment #1

**EE475**

**Fall 2005**

Assigned: Thursday, September 8, 2005

Due AT THE START OF CLASS on Thursday, September 15, 2005

*You need to hand in a concisely written description of your approach, your actual source code including comments, the output of the program, and unequivocal evidence to verify the results.*

Write a C function with the prototype:

```
void itobin(short int ival, char *buf)
```

that takes the short integer `ival` and produces a character string of one and zero characters contained in the string `buf`, representing the bits of `ival` in binary form.

For example, assuming a 16-bit short integer size,

if `ival=23`, the binary string should be: "0000000000010111"

if `ival=-31000`, the binary string (2's complement) should be: "1000011011101000"

Your function will need to determine the size in bytes of a `short int` for the compiler you use.

*Question: do you also need to consider the "endian" storage format of the processor?*

The `main()` program that calls your function `itobin()` must declare the character string `buf` to be long enough to hold the required number of bits, e.g., if a `short int` is 4 bytes, then `buf` must be able to hold 32 characters.

*Question: do you need to declare the total string length plus space for the null string terminator, or does the C compiler take care of that?*

Write a `main()` routine that tests your `itobin()` function by allowing the user to enter an integer, then prints the integer in decimal and the string produced by `itobin()` including leading zeros.

Show your results for a comprehensive variety of positive and negative values of `ival`, and explain your testing method.