

# Homework Assignment #1

**EE475**

**Fall 2004**

Assigned: Thursday, September 9, 2004

Due AT THE START OF CLASS on Thursday, September 16, 2004

*For each problem 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.*

## Problem 1:

Thanksgiving is always the fourth Thursday in November, which this year is the 25th. Using this information and your knowledge of the number of days per month and the effect of leap years, write a C program that determines the numerical date of Thanksgiving for each year from 2004 through 2054.

Print your result in a nicely formatted table. Include a clear explanation of your algorithm and how you verified the results.

## Problem 2:

Write a function with the prototype:

```
unsigned short rotate_short(unsigned short xval, int n)
```

that returns the result of bit rotating the unsigned short integer `xval` by `n` bit positions: if `n` is *positive* the rotation must occur to the *left*. If `n` is *negative* the rotation must occur to the *right*, and if `n` is greater in magnitude than the number of bits in the word the rotation must occur with the proper modulo. Rotation means that bits shifted out of the left or right side of the integer reappear into the opposite side. Your program will need to determine the size in bytes of an `unsigned short` for the compiler you use.

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

if `xval=23` (0000000000010111) and `n=3`: output = 184 (0000000010111000)

if `xval=31000` (0111100100011000) and `n=-3`: output = 3875 (0000111100100011)

Write a `main( )` routine that tests your `rotate_short( )` function by allowing the user to enter both the unsigned short integer and the left rotation amount, then prints the integer in decimal AND in binary form including leading zeros. You may need to think about how best to print in binary format.

Show your results for a comprehensive variety of small and large values of `xval` and `n`, and explain your testing method.