

COS 335 Spring 2011 Assignment 7

Due Tuesday April 12

This assignment would normally be due Thursday April 7 but we have an exam scheduled for that day. This material will be covered on the exam so doing this work before the exam is highly recommended – it is the best way to study.

1. (1 pt) Compute the product of -5 and 6 using Booth's algorithm and 4-bit integers
2. (1 pt) Compute the product of -21 and 17 using Booth's algorithm and 6-bit integers
3. (1 pt) Divide -77 by 13 in 8-bit arithmetic using the restoring 2's complement division algorithm
4. (1 pt) Divide 145 by -11 in 12-bit arithmetic using the restoring 2's complement division algorithm
5. (1 pt) Show how the following floating point operations would be performed (in decimal) where the mantissa has 4 decimal digits and show results in normalized form (1 decimal digit to the left of the decimal place) . Allow four guard digits for aligning mantissas.

a. $3.344 * 10^1 + 8.877 * 10^{-2}$

b. $8.844 * 10^{-3} - 2.233 * 10^{-1}$

6. (2 pts) Consider a reduced 8-bit IEEE format, with a sign bit, a 3 bit bias-7 exponent, and a 4 bit mantissa **that does not use a hidden bit**. The mantissa is in the form .bbbb where the implied binomial point is before the first digit, so that values between -1.0 and +1.0. There are 256 representable values in this format. Write a program in the high-level language of your choice to display a table or list of the 256 bit patterns with their decimal values. You can produce shorter output if you like by listing the 7 bits other than the sign bit with +/- indications. Submit your program listing and output.

7. (3 pts) Write a NASM program with two functions, using stack parameters, as follows:

A. A function that extracts the exponents from IEEE 32-bit floats and returns the decimal value. For example for the float 3F800000h (1.0) decimal the exponent is 0. The function accepts a single parameter passed by value on the stack and returns the decimal value of the exponent in eax.

B. A function that accepts a dword passed by value, and a pointer to an eight byte character string. The function fills the character string with the printable eight byte hexadecimal ASCII representation.

Your program should use the data definitions below, and for each number, display the data in hex, and show the decimal value of the exponent.

```
fl oats      dd 4C800002h, 0C8800070h, 42280000h, 0BE700000h
             dd 45000000h, 42C9C000h, 0BCF5C28Fh, 0C78DDE80h
```