

COE 308, Computer Architecture, Term 982
HW# 2

Due date: Wednesday, Feb. 24

Q.1. Modify the flowchart for unsigned binary division given in Figure 8.15 to reduce the number of addition/subtraction operations.

Q.2. Multiply the following in binary two's complement notation using 6-bit words:

(i) 13 times 3

(ii) -5 times 7

Q.3. Divide the following in binary two's complement notation using 6-bit words:

(i) -27 by 3

(ii) -15 by -4

Q.4. Express the following numbers in IEEE 32-bit floating-point format, and perform the addition operation $A+B$:

(i) $A=-7$

(ii) $B=1.33$

Q.5. Express the following numbers in IBM's 32-bit floating-point format, which uses a 7-bit exponent with an implied base of 16, and perform the subtraction operation $A-B$:

(i) $A=0.75$

(ii) $B=-31 \times 10^5$

Q.6. What would be the bias value for:

(i) A base-2 exponent ($B=2$) in a 5-bit field

(ii) A base-8 exponent ($B=8$) in a 6-bit field

Q.7. One of the most serious errors in computer calculations occurs when two nearly equal numbers are subtracted. Consider $A=0.22244$ and $B=0.22211$. The computer truncates all values to four decimal digits. Thus, $A^*=0.2224$ and $B^*=0.2221$.

(i) What are the relative errors for A^* and B^* ?

(ii) What is the relative error for $C^*=A^*-B^*$?