EE 3755

Spring 2003

HW#1 Solutions

[1] See solution of problem 1 of HW#1@.

[2] See solution of problem 4 of HW#1@.

[3] See solution of problem 9 of HW#1@.

[4] See solution of problem 10 of HW#1@.

[5] See solution of problem 11 of HW#1@.

6 1. Align/adjust

$e_1 - e_2 = e_1 +$ 2's complement of $e_2 =$

$= 0111$

$+) \ 0111$

$0\ 1110$

$\hookrightarrow c=0 \Rightarrow e_1 - e_2 < 0 \Rightarrow e_1 < e_2$ and

$e_2 - e_1 =$ 2's compl. of $(1110) = (0010)_2 = (2)_{10}$

Thus A_1 becomes

	s_1	e_2	f_1'
A_1:	0	1001	00111100

2. Subtract fractions

Since A_1 and A_2 are of different signs and $A_1 + A_2$ needs to be performed, a subtraction must take place.

$f_1' - f_2 = f_1' +$ 2's complement of $f_2 =$

$= \ .00111100$

$+) \ .01101110$

0.10100010

$\hookrightarrow c=0 \Rightarrow f_1' - f_2 < 0 \Rightarrow f_1' < f_2$

Since f_2 is the larger fraction, the result $A_3 = A_1 + A_2$ must have as a sign bit the sign bit of A_2 (negative sign)
The fraction of $A_3 = A_1 + A_2$ will be the 2's compl. of $(10101010) = 01010110$
Therefore

A_3: | 1 | 1001 | 01010110 |

3. Postnormalize

After postnormalization we get

	s_3	e_3	f_3
A_3:	1	1000	10101100

4. Check for exponent underflow

No exponent underflow occured
See that $e_3 = (1000)_2 = 8 \in [0 \quad 15]$

7 (4)

(a)

$$G_5^* = G_{23} + G_{22} \cdot P_{23} + G_{21} \cdot P_{22} \cdot P_{23} + G_{20} \cdot P_{21} \cdot P_{22} \cdot P_{23}$$

(b) $P_6^* = P_{27} \cdot P_{26} \cdot P_{25} \cdot P_{24}$

(c) $C_{23} = G_5^* + G_4^* \cdot P_5^* + G_3^* \cdot P_4^* \cdot P_5^* + G_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^*$
$+ G_1^* \cdot P_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^* + G_0^* \cdot P_1^* \cdot P_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^*$
$+ C_{-1} \cdot P_0^* \cdot P_1^* \cdot P_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^*$

(d) $C_{26} = G_{26} + G_{25} \cdot P_{26} + G_{24} \cdot P_{25} \cdot P_{26} +$

~~$G_{23} \cdot P_{24}^* \cdot P_{25} \cdot P_{26}$~~ $C_{23} \cdot P_{24} \cdot P_{25} \cdot P_{26}$