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. <u>Align/adjust</u>

$e_1 - e_2 = e_1 + 2\text{s complement of } e_2 =$

$$
\begin{array}{r}
0111 \\
+) \ 0111 \\
\hline
0\ 1110
\end{array}
$$

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

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

Thus A_1 becomes

$$
A_1 : \ \boxed{0 \ | \ 1001 \ | \ 00\ 111100}
$$
$\qquad\quad s_1 \quad\ e_2 \qquad\ f_1'$

2. <u>Subtract fractions</u>

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

$f_1' - f_2 = f_1' + 2\text{s complement of } f_2 =$

$$
\begin{array}{r}
.00111100 \\
+) \ .01101110 \\
\hline
0.10100010
\end{array}
$$

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

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

A_3: 1 | 1000 | 10101100

with labels s_3, e_3, f_3

4. Check for exponent underflow

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

⑦

④ ⬤

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

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

ⓒ $C_{23} = G_5^* + G_4^* \cdot P_5^* + G_3^* \cdot P_4^* \cdot P_5^* + G_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^*$

$$+ G_1^* \cdot P_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^* + G_0^* \cdot P_1^* \cdot P_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^*$$

$$+ C_{-1} \cdot P_0^* \cdot P_1^* \cdot P_2^* \cdot P_3^* \cdot P_4^* \cdot P_5^*$$

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

~~G₂₃ G₂₄ +~~ $C_{23} \cdot P_{24} \cdot P_{25} \cdot P_{26}$