

HW6: Integer and real division

(CS220-02)

For problems 1 through 7, assume a 6 bit machine and that
 A = 000111, B = 111100, C = 011010, D = 110101 and E = 111101

Unsigned Integer Division

- 1) (a) Show work to find the 6 bit unsigned quotient and remainder of B / C. (b) What is the decimal equivalent of the answer?

$$111100 / 011010 =$$

$$2\text{'s complement of } 011010 = 100101 + 1 = 100110$$

$$\begin{array}{r}
 1 \\
 \hline
 011010 \overline{) 111100} \\
 \underline{+100110} \\
 100010 \\
 \underline{+100110} \\
 001000
 \end{array}$$

$$Q : 1, R : 1000$$

- 2) (a) Show work to find the 6 bit unsigned quotient and remainder of C / A. (b) What is the decimal equivalent of the answer?

$$011010 / 000111 =$$

$$2\text{'s complement of } 000111 = 111000 + 1 = 111001$$

$$\begin{array}{r}
 1 \\
 \hline
 000111 \overline{) 011010} \\
 \underline{+111001} \\
 100010 \\
 \underline{+100110} \\
 001000
 \end{array}$$

$$Q : 1, R : 1000$$

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A = 000111, B = 111100, C = 011010, D = 110101 and E = 111101

Signed Integer Division

- 3) (a) Show work to find the 6 bit signed 2s' complement quotient and remainder of C / A.
(b) What is the decimal equivalent of the answer?

- 4) (a) Show work to find the 6 bit signed 2s' complement quotient and remainder of D / B.
(b) What is the decimal equivalent of the answer?

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- 5) (a) Show work to find the 6 bit signed 2s' complement quotient and remainder of A / E.
(b) What is the decimal equivalent of the answer?

- 6) (a) Show work to find the 6 bit signed 2s' complement quotient and remainder of C / -B.
(b) What is the decimal equivalent of the answer?

A = 000111, B = 111100, C = 011010, D = 110101 and E = 111101

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- 7) (a) Show work to find the 6 bit signed 2s' complement quotient and remainder of B / -E.
(b) What is the decimal equivalent of the answer?

Unsigned Real Division

- 8) Show your work to calculate the binary real valued result of 116 / 5 with 5 bits of precision in the fractional portion of the result.

$$116 / 5 =$$

$$\begin{array}{r} 023 \\ \hline 5 \overline{) 116} \\ \underline{-10} \\ 16 \\ \underline{-15} \\ 1 \end{array}$$

$$116 / 5 = 23 + 1/5 = 23.20000$$

A = 000111, B = 111100, C = 011010, D = 110101 and E = 111101

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- 9) Show your work to calculate the binary real valued result of $30 / 8$ with 5 bits of precision in the fractional portion of the result.

$$30 / 8 =$$

$$\begin{array}{r} 04 \\ \hline 8 \overline{) 30} \\ - 24 \\ \hline 6 \end{array}$$

$$30 / 8 = 4 + 6/8 = 4.75000$$

- 10) Show your work to calculate the binary real valued result of $17 / 10$ with 5 bits of precision in the fractional portion of the result.

$$17 / 10 =$$

$$\begin{array}{r} 01 \\ \hline 10 \overline{) 17} \\ - 10 \\ \hline 7 \end{array}$$

$$17 / 10 = 1 + 7/10 = 1.70000$$