LAMC Intermediate I & II **October 19, 2014**

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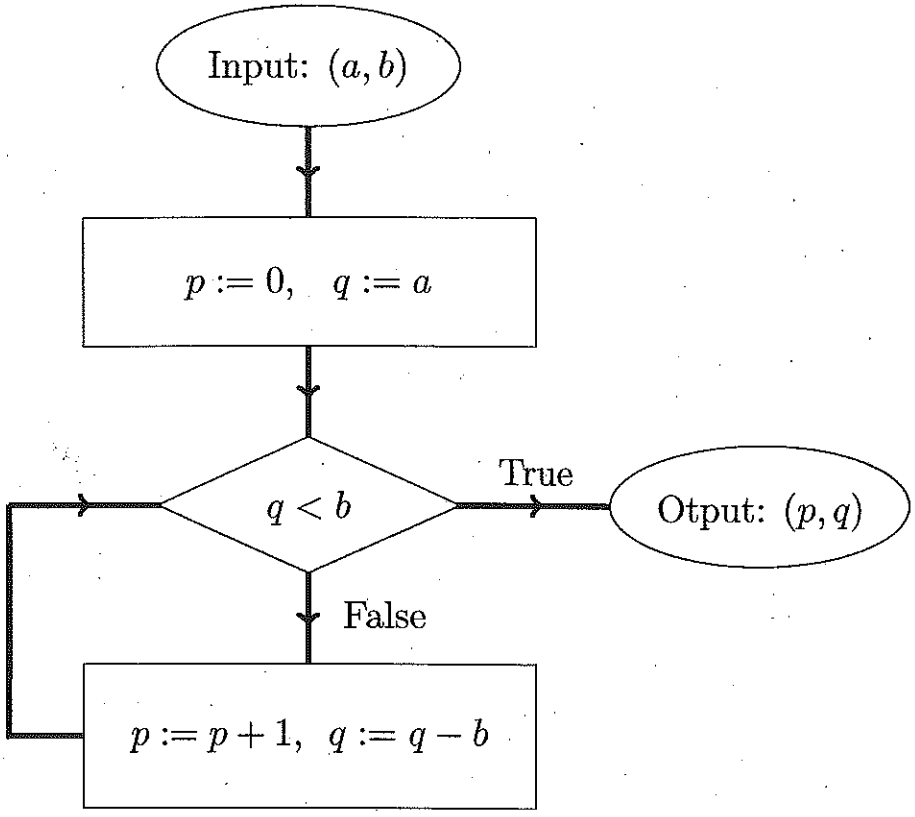
Division Algorithm



Problem 1 *Input:* $(4, 2)$.

Cycle 1

$p = 0$ $q = 4$

Is the statement $q < b$ *true or false?*

Cycle 2

$p = 1$ $q = 2$

Is the statement $q < b$ *true or false?*

Cycle 3

$p = 2$ $q = 0$

Is the statement $q < b$ *true or false?*

Output: $(p, q) = (2, 0)$

What does the output mean?

$4 = 2 \cdot 2 + 0$

Problem 2 *Input:* $(2, 3)$.

Cycle 1

$p = 0$ $q = 2$

Is the statement $q < b$ *true or false?*

Output: $(p, q) = (0, 2)$

What does the output mean?

$2 = 0 \cdot 3 + 2$

Problem 3 *Input:* $(8, 3)$.

Cycle 1

$p = 0$ $q = 8$

Is the statement $q < b$ *true or false?*

Cycle 2

$p = 1$ $q = 5$

Is the statement $q < b$ *true or false?*

Cycle 3

$p = 2$ $q = 2$

Is the statement $q < b$ *true or false?*

Output: $(p, q) = (2, 2)$

What does the output mean?

$8 = 2 \cdot 3 + 2$

Let us switch to the binaries.

Problem 4 *Input:* $(1011, 100)$.

Cycle 1

$p = 0$ $q = 1011$

Is the statement $q < b$ *true or false?*

Cycle 2

$$\begin{array}{r} 1011 \\ -100 \\ \hline 111 \end{array}$$

$p = 1$ $q = 111$

Is the statement $q < b$ *true or false?*

Cycle 3

111
100
11

$p = 10$ $q = 11$

Is the statement $q < b$ *true or false?*

Output: $(p, q) = (10, 11)$

What does the output mean?

$1011 = 10 \times 100 + 11$

Let's check...

10 11
~~1101~~$_2 = 1 + 2 + 8 = 11$ *decimal value please*

$100_2 = 4$ *decimal value please*

Divide the first decimal number by the second (with the remainder) and see if everything works out right.

$11 = 2 \cdot 4 + 3$

((

10 11

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