

Computer Architecture I - SS09
Exercise Sheet 8 (due: 6.07.09)

Exercise 1: (scheduling functions, warm up) (3 points)

Using an assumption $t \geq k$ prove the following statement for the machine without forwarding and stalling:

$$\forall m, k \in \mathbb{N}^+. m \leq k \rightarrow I(k, t) = I(m, t) - (k - m),$$

where \mathbb{N}^+ is the set of natural numbers without 0.

Exercise 2: (hardware modulo computation) (6 points)

Construct a circuit that inputs two unsigned numbers $a, b \in \{0, 1\}^{32}$ and computes the output $c \in \{0, 1\}^{32}$

$$c = a \bmod b$$

Give the formal description of the constructed circuit.

Exercise 3: (DLX assembler programming) (4 points)

Write a DLX assembler program for sequential DLX that use two *32-bit unsigned numbers* A and B stored in registers $GPR[1]$ and $GPR[2]$, and compute the modulo value $C = A \bmod B$. This value must be stored in $GPR[3]$. Compute two different examples for your program. Comment the code in a way everyone can understand it.