



Computer Architecture II – WS 05/06

(due: Monday, 13.02.2006)

Exercise 1: (Incrementer)

(5 + 5 points)

Let:

$$a, b \in \{0, 1\}^n \quad inc, ovf \in \{0, 1\}$$

A n -bit special purpose incrementer (n -SPI) is a circuit with two inputs a , inc and two outputs b , ovf satisfying:

$$\langle b \rangle = \begin{cases} \langle a \rangle & : \overline{inc} \\ \langle a \rangle + 1 \bmod 2^n & : inc \end{cases}$$

$$ovf = ((a = 1^n) \wedge inc)$$

1. Construct an n -SPI using less than $3 \cdot n$ gates.
2. Prove the correctness of your construction.

Exercise 2: (Message transmission)

(40 points)

Give a detailed proof of lemma 6.6 to be found on page 22 in the latest version of the lecture script, that is linked at the lecture homepage.

You can assume the correctness of all lemmata < 6.6