T-79.179 **Spring 2005**
Parallel and Distributed Digital Systems
Exercise 6
11-17.4 2005

7.1.1 Assume renaming function $f : A \to A$ with $f(a) = c$ and $f(b) = c$. Derive

$$\rho_f(\langle X | X = aX + bX \rangle) = \langle Y \mid Y = cY \rangle$$

from the axioms.

7.2.2 Let $A = \{push, on, \mathit{off}\}$ and $S = \{0, 1\}$, where intuitively state 0 represents that some machine is off, and state 1 that this same machine is on. Use the state operator to specify a button, such that pushing this button alternately turns the machine on and off. That is, define mappings $action : S \times A \to A$ and $\mathit{effect} : S \times A \to S$ such that

$$\lambda_0(\langle X | X = push \cdot X \rangle) = on \cdot \mathit{off} \cdot \lambda_0(\langle X | X = push \cdot X \rangle).$$

Derive the equation above from the axioms for the state operator, using your definitions for the mappings *action* and *effect*.

7.3.3 Let $b < c$, $a < \tau$, $b < \tau$, and $c < \tau$. Derive the equation

$$\Theta(a(\tau(b + c) + b)) = \Theta(a(b + c))$$

from the axioms.