

CSE 350 Theory of Computation: Honors

HW 3

Due: March 5, 2008

1. Design the finite automaton of a vending machine that dispenses only coffee:
 - it accepts only quarters
 - a coffee costs 50 cents
 - it has one button to dispense coffee
 - if the button is pressed when the machine has less than 50 cents, nothing happens
 - if the button is pressed when the machine has at least 50 cents, it gives the coffee and it resets to 0
 - if more than 2 quarters are inserted, the machine keeps them¹

Define the language of this machine using the set notation.

2. Design the finite automaton of a vending machine that dispenses only tea. The machine has the same description of the one above, but a tea costs 25 cents². Define the language of this machine using the set notation.
3. Combine the previous two machines to obtain a new one that dispenses both tea and coffee (using 2 different buttons). Define the language of the new machine. Which regular operation did you do here?
4. Define the finite automaton of a “person” that wants coffee and/or tea:
 - he/she can insert quarters (he/she has unlimited number of quarters)
 - he/she can press buttons (he/she knows which button is which)
 - he/she can pick up and drink the beverage (this can be a single action)

Define the language of this machine using the set notation.

5. Write the finite automaton of the interaction between the person and the coffee/tea machine. Define the resulting language. Which regular operation did you use here?

¹Here it might seem that the machine is mean, because it stills the money, but it is actually nice, because this makes the problem simpler.

²There is no particular reason why tea is cheaper than coffee, besides that this makes the problem more interesting