# Exercises: CTL *

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1. Consider an elevator system that services $N > 0$ floors numbered 0 through $N - 1$. There is an elevator door at each floor with a call button and an indicator light that signals whether or not the elevator has been called. In the elevator cabin there are $N$ send buttons (one per floor) and $N$ indicator lights that inform to which floor(s) is going to be sent. Present a set of atomic propositions — try to minimize the number of propositions — that are needed to describe the following properties of the elevator system as CTL formulae and give the corresponding CTL formulae:

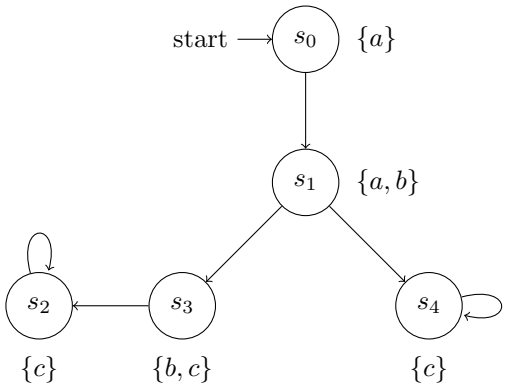
   (a) The doors are safe, i.e., a floor door is never open if the cabin is not present at the given floor.

   (b) The indicator lights correctly reflect the current requests. That is, each time a button is pressed, there is a corresponding request that needs to be memorized until fulfillment (if ever).

   (c) The elevator only services the requested floors and does not move when there is no request.

   (d) All requests are eventually satisfied.

2. Using the CTL model checking algorithm, decide whether the following transition system satisfies the CTL formulas below. Sketch the main steps.




   (a) $EF\ AG\ c$

   (b) $A[a\ U\ AF\ c]$

*Adapted from *Principles of Model Checking*, Baier & Katoen, 2008.