<u>Exercise 1</u>

When studying the material, perhaps you noticed that Cohen & Levesque in their paper employ the operator AGT i α also for complex action α, with as informal reading that the agent referred to by i is the actor/executor of action α, while it is only properly defined for atomic actions (action variables). This is a (minor) omission in their paper. How can this be mended, in other words, how could one define AGT i α for complex actions α, with the intended meaning, provided that one already has defined it for atomic ones?

<u>Exercise 2</u>

How would you (formally) specify in KARO that an agent commits only to maximally n (n 1) actions on/in its agenda? (Consider two types of agents: one which is able to use the uncommit action to 'forget' about commitments in its agenda, and one which isn't able to use uncommit actions at all.)

<u>Exercise 3</u>

Could one specify (formally) in KARO an agent that is committed to an action α for achieving a goal φ until it believes (or knows) it has achieved φ or it believes (knows) it cannot ever achieve φ any more (after which it will drop the commitment to α)? If so, how would you do this? If not, give a reason why not.

<u>Exercise 4</u>

Give similarities and differences between the logic approaches to agents by Cohen & Levesque, Rao & Georgeff and KARO. Do this as systematic as possible.

<u>Exercise 5</u>

(a) Describe succinctly the essence of "The Little Nell Problem".
(b) Has this problem been solved in the theory of Cohen & Levesque? If so, how?
(c) The same questions as (b) w.r.t. the theory of Rao & Georgeff.
(d) The same questions as (b) w.r.t. the KARO approach

<u>Opgave 6</u>

Beschouw het volgende scenario in de situation calculus: een robot op een 2 bij 2 grid, zoals in de figuur op de ommezijde van deze bladzijde. De robot's startpositie in (0,0). De robot beschikt over twee acties: 'right' (ga een hokje naar rechts) en 'up' (ga een hokje omhoog). Uiteraard moet hierbij wel binnen het grid worden gebleven, zodat de acties 'right' en 'up' alleen uitgevoerd kunnen worden als er nog een hokje vrij is rechts resp. boven de huidige locatie. Doel is positie (1,1).

Bedoeling is via regressie een plan te berekenen (zie slides Hölldobler & Tielscher). De predicaten ('fluents') zijn: 'x-loc = n' ("de x-locatie van de robot is n", 0 n 1), en 'y-loc = m' (“de y-locatie van de robot is m”, 0 m 1). In de startsituatie geldt dus holds (x-loc = 0 $\wedge$ y-loc = 0, S_0) en de doelsituatie is: g(S) = holds(x-loc = 1 $\wedge$ y-loc = 1, S).

(a) Geef action precondition axioma’s voor de acties ‘right’ en ‘up’.

(b) Geef successor state axioma’s voor de fluents ‘x-loc = n’ en ‘y-loc = m’.

(c) Pas regressie toe om goal situatie S met g(S) te vinden. (Hint: contreer je op het uitrekenen van $\Gamma_2(S_0)$.)Wat is dus het gevonden plan?

(0,1)	(1,1)
(0,0)	(1,0)