11.4 Modeling an "Able" Invader—the "Cane" Toad

## *AgentSheets* Quick Review Questions

*Introduction to Computational Science:*

*Modeling and Simulation for the Sciences, 2nd Edition*

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***Compose all the following answers in AgentSheets*:**

Phase 0: Initialization

**Quick Review Question 1** Write the method *createToads*.

**Quick Review Question 2** Write the*WHEN-CREATING-NEW-AGENT* method for initialization of a *Toad* agent.

**Quick Review Question 3** Suppose *PERCENT\_AWPS* is 0.3, *PERCENT\_AWPS\_FENCED* is 25, and *PERCENT\_MOIST\_AREAS* is 0.1 and the grid is 100-by-40 cells. On the average, after the initialization phase how many of the following would we expect on the grid:

**a.** *Awp* agents before initialization of *FencedAwp* agents

**b.** *FencedAwp* agents

**c.** *Awp* agents after initialization of *FencedAwp* agents

**d.** *MoistArea* agents

**e.** If there are 5 *Awp*, 2 *FencedAwp*, and 3 *MoistArea* agents, none of which are next to a border or each other, how many *AwpAdjacent* agents are there?

**Quick Review Question 4** Write the following *Desert* methods for completion of the landscape:

**a.** *placeAwps*

**b.** *placeFencedAwps*

**c.** *initAwp*

**d.** *initAwp2*

Phase 1: Consumption

**Quick Review Question 5** Suppose *AMT\_EAT* = 0.01 and *FRACTION\_WATER* = 0.6. Assume a toad is on top of a desert cell. Give the values of a toad's *energy* and *water* and a desert cell's *food* after execution of *eat* and *updateFood* for each of the following situations:

**a.** *energy* = 0.9, *water* = 0.8, and *availableFood* = 0.03

**b.** *energy* = 0.9, *water* = 0.8, and *availableFood* = 0.005

**c.** *energy* = 0.999, *water* = 0.8, and *availableFood* = 0.03

**d.** *energy* = 0.9, *water* = 0.999, and *availableFood* = 0.03

**Quick Review Question 6** Write the following consumption methods:

**a.** *Toad* method *toadMayEat*

**b.** *Toad* method *eat*

**c.** *Desert* method *updateFood*

**d.** *Toad* method *toadMayDrink*

**e.** *Toad* method *drink*

Phase 2: Movement

**Quick Review Question 7** Write the toad method *toadMove*.

**Quick Review Question 8** Write the following functions related to movement for moisture:

**a.** *thirsty*

**b.** *stayHere* and *here*

**c.** *lookForMoisture*

**d.** *moveW*

**e.** *useWaterEnergyHopping*

**Quick Review Question 9** Write the *Toad* method *lookForFood*.

**Quick Review Question 10** Write the following *Toad* methods related to hopping for fun:

**a.** *hopForFun*

**b.** *hopHere*

Phase 3: Complete Cycle

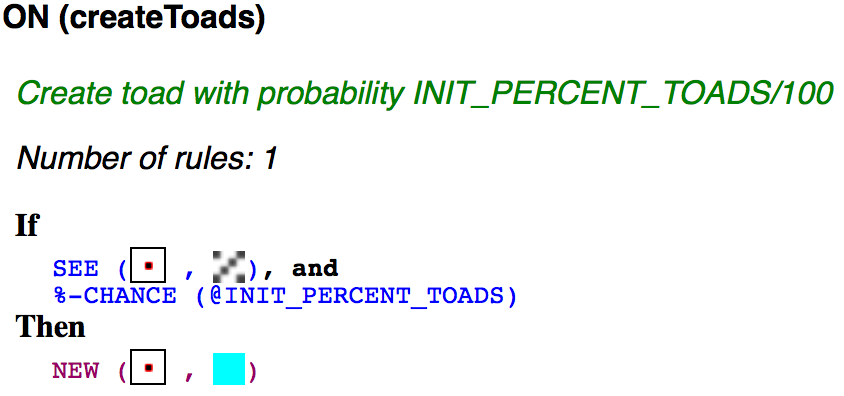
**Quick Review Question 11** Write the following functions:

**a.** *changeCounts*

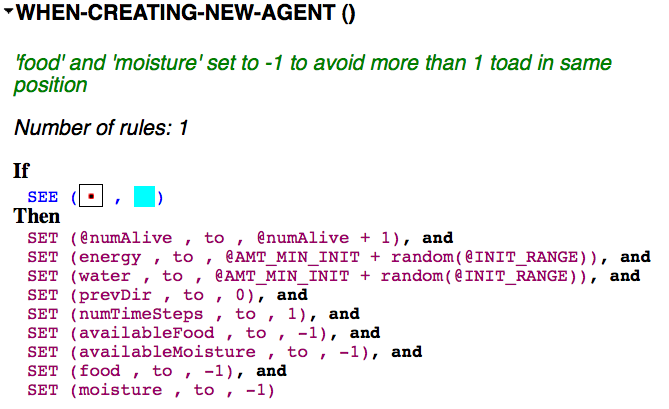
**b.** *checkTerminate*

Answers to Quick Review Questions

**1.**



**2.**

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**3. a.** 12 = (0.003)(100)(40)

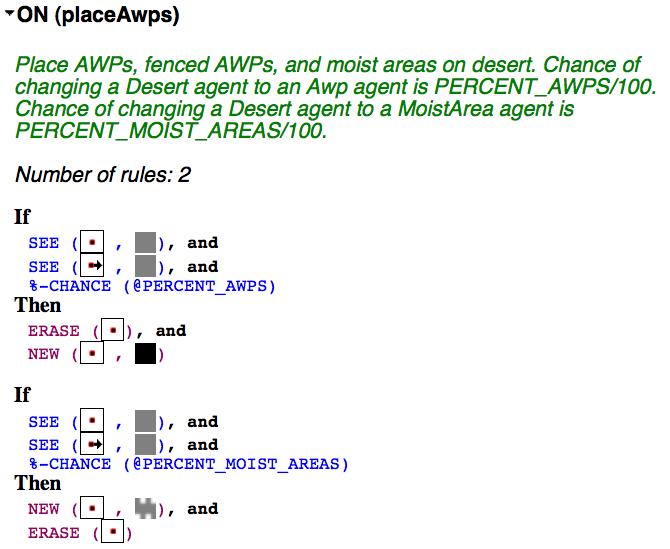
**b.** 3 = (0.25)(12), where 12 is obtained from Part a

**c.** 9 = 12 - 3

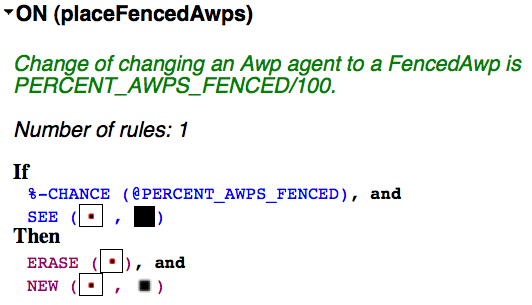
**d.** A little less than 4 =(0.001)(100)(40), because immediately before initialization of moist areas, some of the (100)(40) = 4000 *Desert* agents have likely been converted to *Awp* and/or *FencedAwp* agents

**e.** 56 = (8)(5 + 2) because each *Awp* and *FencedAwp* agent is surrounded by 8 *AwpAdjacent* agents.

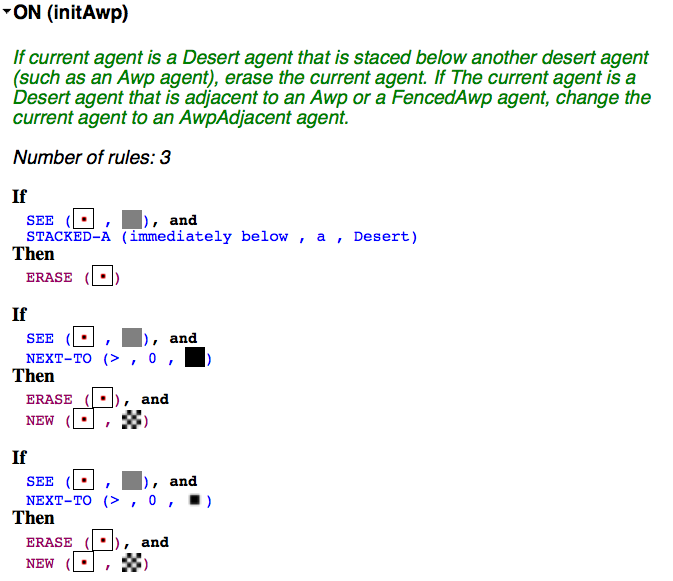
**4. a.**

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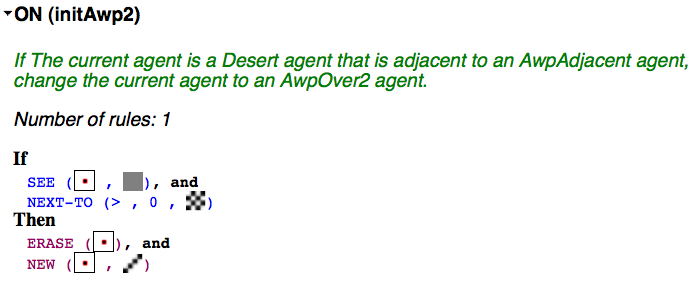
**4. b.**



**4. c.**

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**4. d.**

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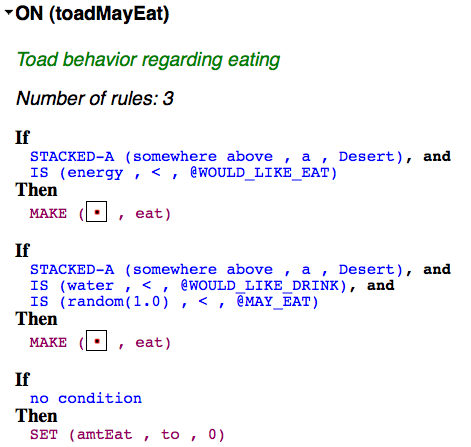
**5. a.** *energy* = 0.91, *water* = 0.806, and *food* = 0.02 because *amtEat* = 0.01, so *energy* = 0.9 + 0.01, *water* = 0.8 + 0.6\*0.01, and *food* = 0.03 - 0.01

**b.** *energy* = 0.905, *water* = 0.803, and *food* = 0.0 because *amtEat* = *availableFood* = 0.005, so *energy* = 0.9 + 0.005, *water* = 0.8 + 0.6\*0.005, and *food*= 0.005 - 0.005

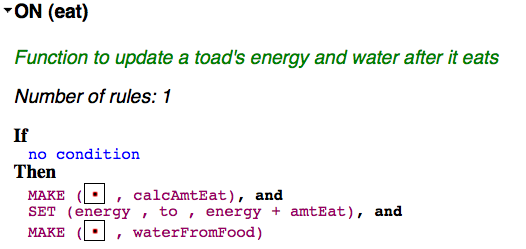
**c.** *energy* = 1.0, *water* = 0.8006, and *food* = 0.029 because *amtEat* = 1 - *energy* = 0.001, so *energy* = 0.9 + 0.001, *water* = 0.8 + 0.6\*0.001, and *food* = 0.03 - 0.001

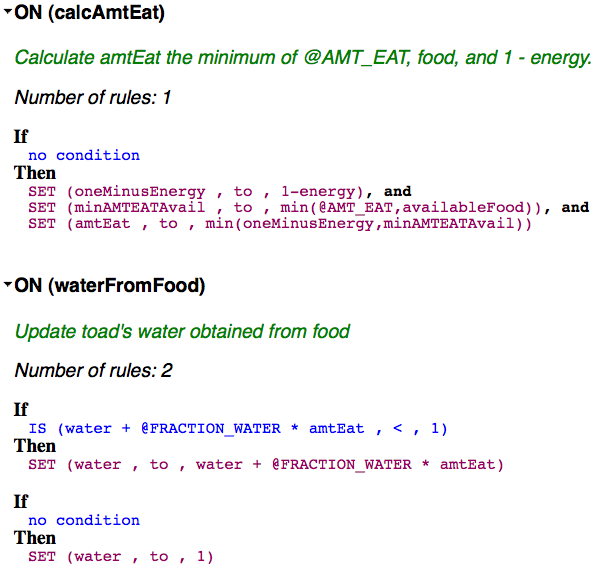
**d.** *energy* = 0.91, *water* = 1.0, and *food* = 0.02 because *amtEat* = 0.01, so *energy* = 0.9 + 0.01, *water* = the minimum of 0.999 + 0.6\*0.01 = 1.005 and 1.0, and *food* = 0.03 - 0.01

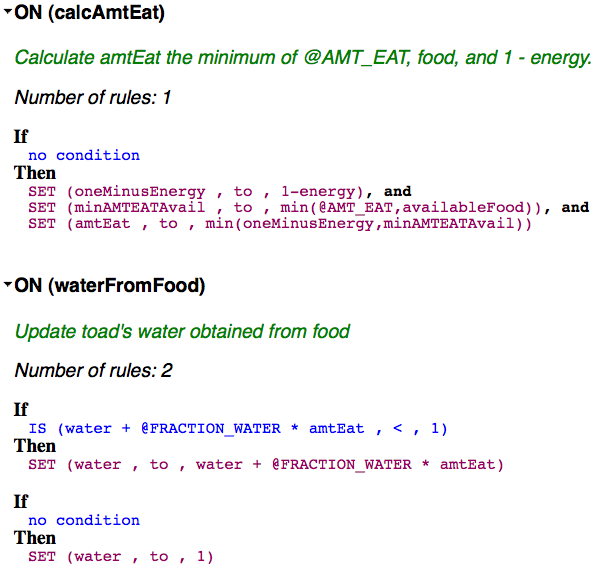
**6. a.**



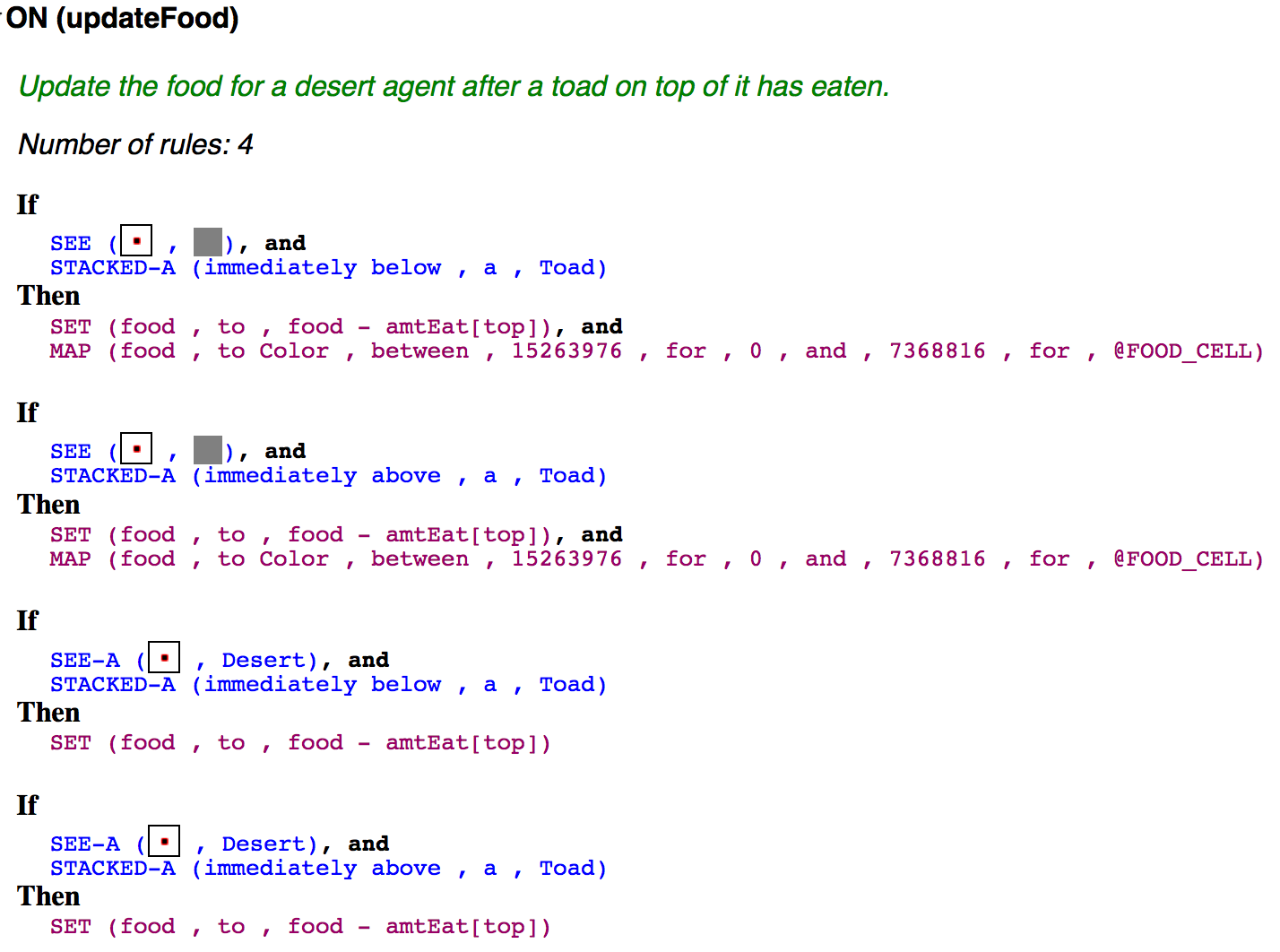
**6. b.**



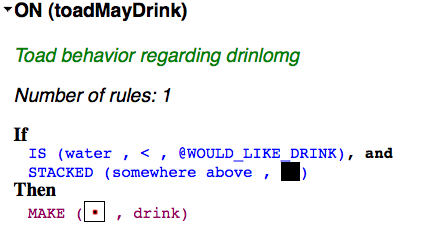




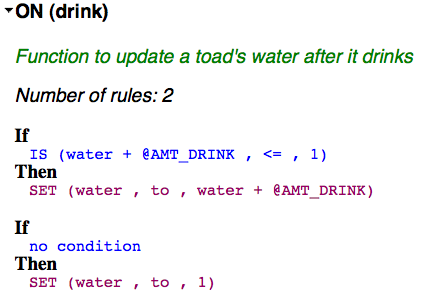
**6. c.**



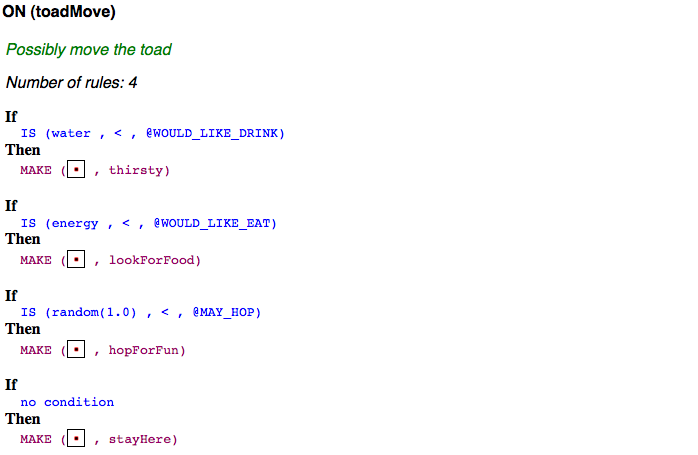
**6. d.**



**6. e.**



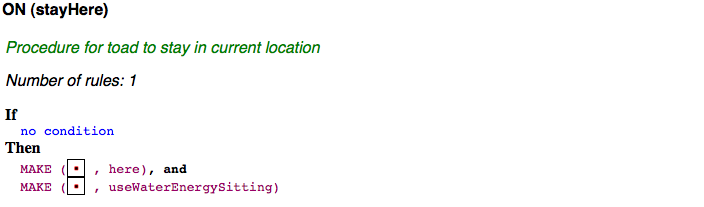
**7.**

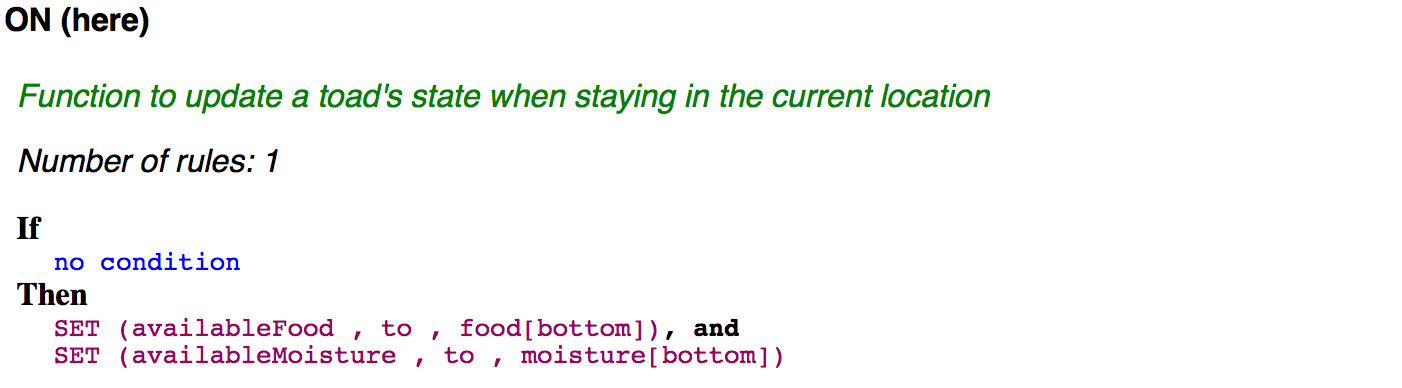


**8. a.**

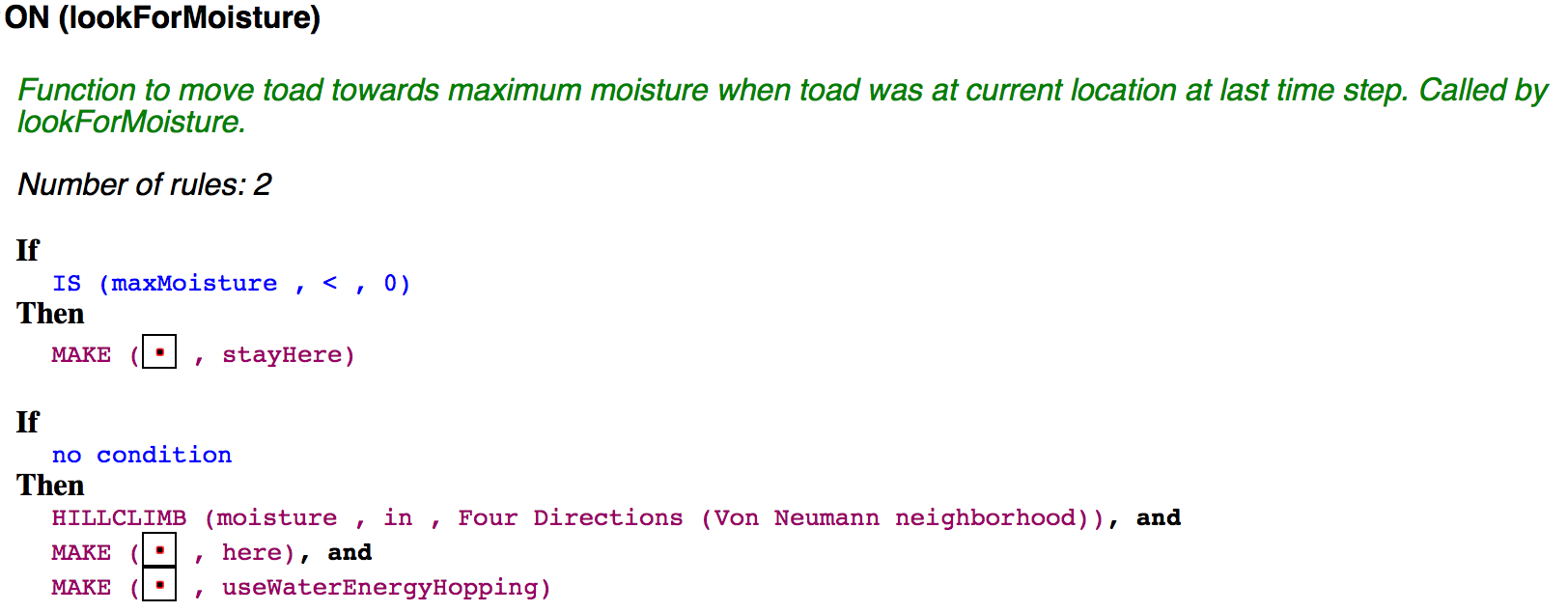


**8. b.**

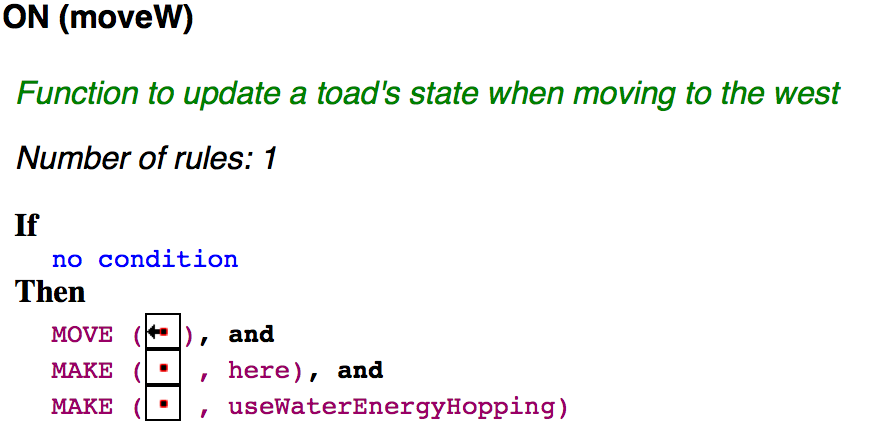




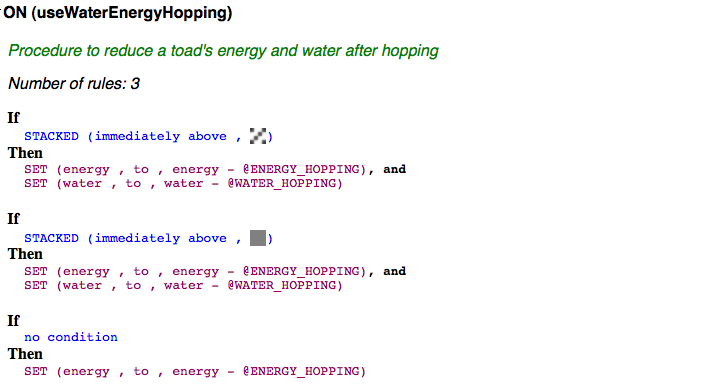
**8. c.**



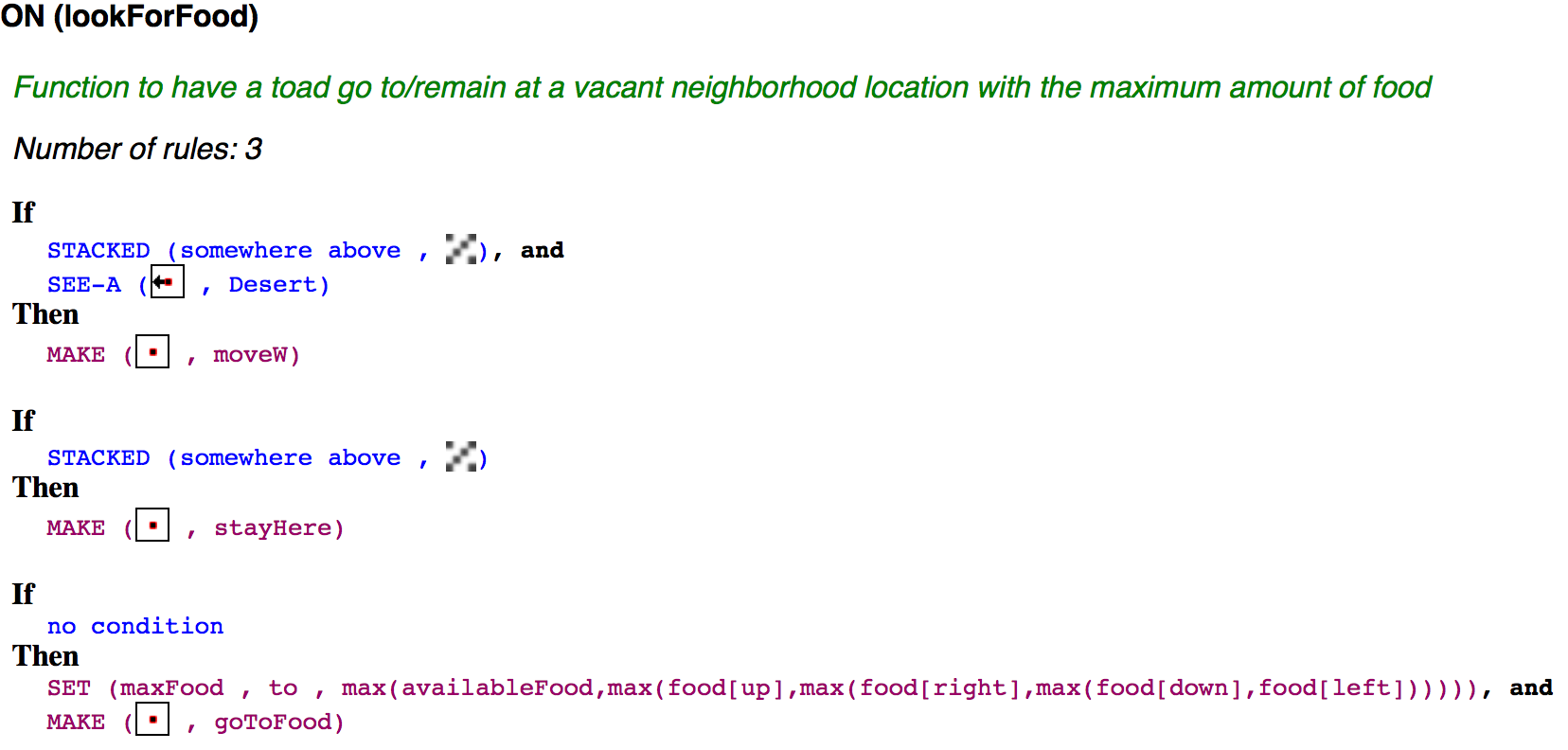
**8. d.**

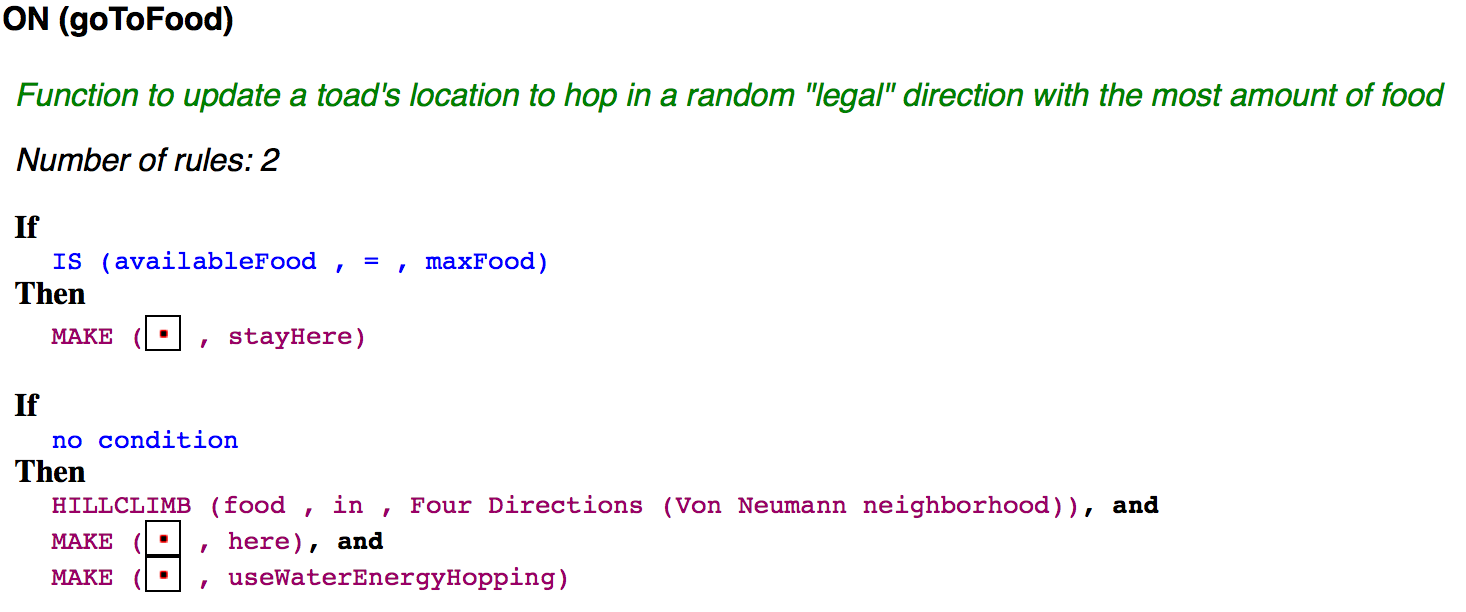


**8. e.**

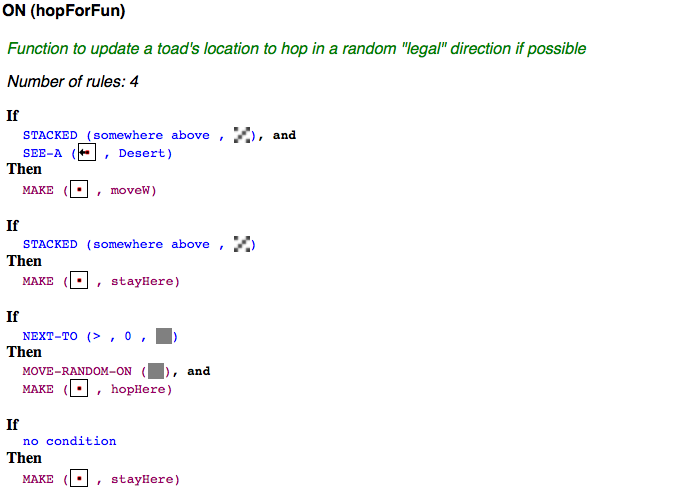


**9.**

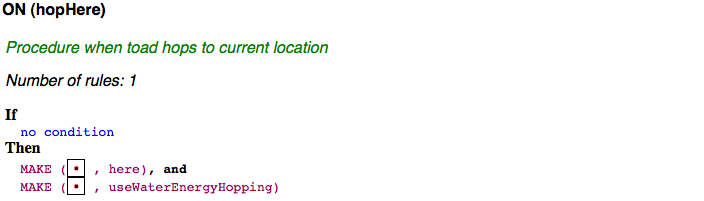




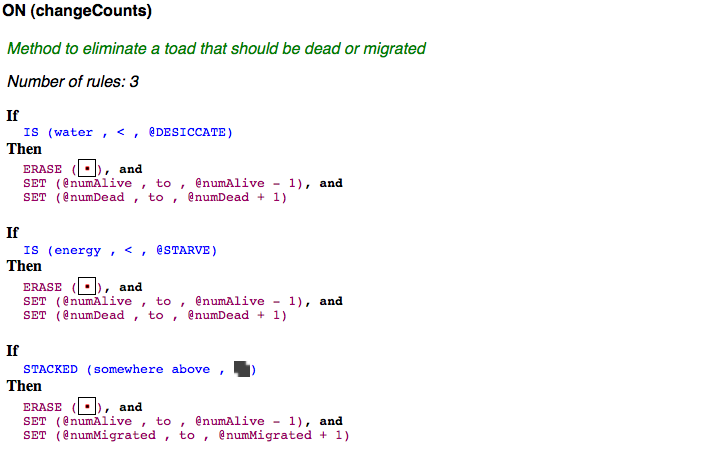
**10. a.**



**10. b.**



**11. a.**



**11. b.**

