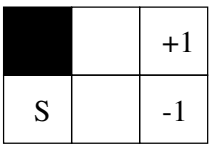
**Tik-79.230** **Kevät 2002**
**Agenttipohjaisen tietojenkäsittelyn perusteet**
**Laskuharjoitus 4**
**Tehtävät**

1. An agent lives in the following world:




   The agent may move in all main directions. However, its movement is not deterministic but it goes to the desired direction only with probability of 0.8. In other cases it moves to either of the state that are 90° from the move direction (or bumbs on a wall staying in the same place).

   Compute the optimal policy for the agent in each state if the cost of a single step is $-0.2$, using:

   (a) Value iteration

   (b) Policy iteration

2. There is a door from kitchen to hall and from hall to outside. Given:

$$U_t = \text{“The outer door is open at time step } t\text{”}$$
$$V_t = \text{“The kitchen door is open at time step } t\text{”}$$
$$A_t = \text{“The observer notices that outer door is open at } t\text{”}$$
$$B_t = \text{“The observer notices that kitchen door is open at } t\text{”}$$
$$P(A_t \,|\, U_t) = 0,9$$
$$P(A_t \,|\, \neg U_t) = 0,1$$
$$P(B_t \,|\, V_t) = 0,7$$
$$P(B_t \,|\, \neg V_t) = 0,1$$
$$P(U_{t+1} \,|\, U_t) = 0,6$$
$$P(U_{t+1} \,|\, \neg U_t) = 0,1$$
$$P(V_{t+1} \,|\, V_t) = 0,6$$
$$P(V_{t+1} \,|\, \neg V_t) = 0,3$$
$$\text{Bel}(U_0) = 0,1$$
$$\text{Bel}(V_0) = 0,3$$

   At time step $t_1$ the observer thinks that both doors are open and that they both are closed at $t_2$. A cat is sleeping in the kitchen and it wakes up at $t_2$. How sure can the observer be that the cat can't escape out through two open doors?