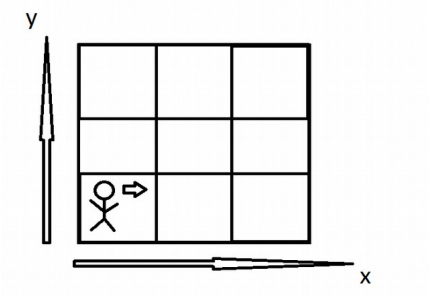
Exercise 3
A little cleaning robot moves in a room represented by the following map, having nine places encoded with coordinates x and y (eg. (1,1), (1,2)…….):



A cat and a dog are also in the room in a position different from the robot. Assume that both the cat and the dog are still and do not move. The robot should clean the room (e.g visit all the free squares) avoiding the cat and the dog.
1) Select a knowledge representation language to represent this scenario, and motivate your choice.
2) Write a KB to represents the robot, the room and the constraints. Define the robot task.
3) Write a query that activates the robot to perform the requested task.

Solution:
We assume the following fluent:
At(agent,cl,place,situation) # cl represents the list of cells to be cleaned.
and these support predicates: At(dog,place), At(cat,place), Adjacent([1,1],[1,2])...

Initial specification:
At(crobot,[[1,2],[2,1]…….],[1,1],S0) AND At(dog,[2,2]) AND At(cat,[2,3])
AND….
Adjacent([1,1],[1,2])
Adjacent([1,1],[2,1])
Adiacent([2,1],[3,1])
Adiacent([2,1],[2,2])
Adjacent([1,2],[2,2])
Adjacent([1,2],[1,3])
Adjacent([2,2],[2,3])
Adjacent([2,2],[3,2])
Adjacent([3,3],[2,3])
Adjacent([3,3],[3,2])

Free(x) ↔ NOT At(cat,x) AND NOT At(dog,x)

Possibility Axioms:
At(crobot,cl,x,s) AND Adjacent(x,y) AND Free(y) → Poss(Go(x,y),s)
At(crobot,cl,x,s) AND member(x,cl) → Poss(Clean(x,cl),s)
At(crobot,cl,x,s) AND Adjacent(y,x) AND Free(y) → Poss(Go(x,y),s)
At(crobot,[],x,s) → Poss(Finish(x),s)

Effect Axioms:
Poss(Go(x,y),s) → At(crobot,cl,y,Result(Go(x,y), s))
Poss(Clean(x,cl),s) → At(crobot,remove(x,cl),x,Result(Clean(x,cl),s))
Poss(Finish(x),s) → Finish(x,Result(Finish(x), s))

GOAL:
EXISTS seq Finish(x,Result(seq,S0))