

Problems

- 1 (20%) Marvin is a robot that inhabits a 2 by 2 grid and can only move North, South, East, and West. Marvin's wheels sometimes spin so that on each action there is a .2 probability that Marvin remains stationary. Marvin receives a reward of 1 whenever it visits top left position.
 1. Draw an MDP which describes Marvin's problem.
 2. What is the optimal policy?
- 2 (10%) In the ABT algorithm, which agents do the most/least work?
- 3 (10%) Draw a 5-node graph (for the graph coloring problem) on which the Adopt algorithm would end up performing a sequentialized search, that is, it would not exhibit any parallelism.
- 4 (20%) Find the pure Nash equilibria, and the Pareto optimal solutions of the following game:

		Alice		
		<i>d</i>	<i>e</i>	<i>f</i>
Bob	<i>a</i>	1,1	0,0	0,0
	<i>b</i>	0,0	2,2	0,0
	<i>c</i>	0,0	0,0	3,3

- 5 (10%) Do the Shapley payments for a particular characteristic form game have to be in the core? Explain.
- 6 (20%) Find the nucleolus solution for the following game:

S	$v(S)$
()	0
(1)	1
(2)	3
(12)	6

- 7 (10%) We know that fictitious play converges to Nash (Theorem 5.2). If an agent knows that they will all be playing fictitious play, why can't it just jump to the equilibrium in the first step (in general)? Give at least two reasons.