Homework 2

1. Explain the difference between goal-based agent and utility-based agent

Goal-based agent is solely focus on achieving a specific goal. It branches out for possible actions just to see hypothetical futures to achieve that specific goal. Utility-based agent looks ahead in the future to see which actions can get the agent to achieve the goal faster and with high quality. Goal-based agent does not care if it will take multiple steps, if those steps will help the agent achieve the goal, it will take the reroute. Utility-based agent on the other hand, the priority is to take the best route, not just any route to achieve a goal. For utility-based agent, every effort has cost, and it quantifies every action. For goal-based agent, every action is worth doing if it gets the agent to the goal. Goal-based agent would simply choose to achieve the goal, utility-based agent chooses the most efficient way to achieve the goal.

2. Imagine environment below, in which the agent can move left, right, up, and down, and pick up stars.[21]

	star		star
agent			
		star	

Try to specify as precisely as you can what conditions would make this environment

a) Fully observable – this environment is fully observable because the rules are finite. The agent can move left, right, up, down or pick up stars. It's fully observable because we can see every

possible move that the agent can perform. There are no hidden variables in the 3x4 environment above.

b) Partially observable – this would be partially observable if the agent has errors in its sensors when detecting stars to pick up or simply it has inaccurate sensors

c) Deterministic – the environment can be deterministic when it senses a star, the next action is determined which to pick up the star and keep moving

d) Stochastic – the environment would be stochastic because the agent can pick randomly whether to move left, right, up, or down. When there are no stars found, it's random to agent whether to move left, right, up or down.

e) Dynamic – dynamic environment can happen when we don't know the maximum stars the agent can pick up and when it will be filled with stars. In this case there's only 3 stars above, but we don't know if our agent can only pick up 1 or 2 or more stars.

f) Static – it can be a static environment if the environment produces stars randomly. We don't know where the stars came from, they can be falling stars or coming from the side

g) Sequential – this can produce a sequential environment when the next state is dependent on the current action. Which is in the situation that the agent senses a star, we know the next actions—to pick up the stars and to keep moving.

h) Episodic – there will be episodic environment when all stars are collected, because when we move left, right, up, and down, moving in any directions won't affect future actions because there are no stars to pick up, everything will be in a repeated action,

i) Known – an environment will be in known environment because it knows what to do when it moves and senses a star, the agent knows to perform an action which is to pick it up

j) Unknown – the only situation I can think of is the first time the agent will pick up a star, that situation would be unknown since the agent is not familiar with process

k) Continuous – continuous environment can occur because the movement of the agent left, right, up, or down cannot be numbered.

l) Discrete – the environment can be discrete because as shown in the picture above, we can count how much stars are available. There is only a finite number of pick-up star action that can be performed.

m) Single-agent – after all the stars are collected, there will be one agent left in the environment

n) Multi-agent – the environment is multi-agent because the stars, which another agent, affect the actions performed by the agent