Question 1

Owning a Private Equity Firm

* The environment in which the task is being performed is the overall stock, bond, and private equity Market.
* The task is making trades and transactions that have some form of Return on investors money
* The way that you can measure the Performance of the Private Equity firm is looking at the ROI at the end of each Quarter (*t*), to the overall target for the Year (*T*).

When thinking about the goal of the Private Equity Group, you can think about their target for how much the firm would like to return back to their investors. For example, 15%-20% is the target, but there are some years where the firm can exceed that goal. If the Firms target is 20% ROI on the year, and you would check the initial fund balance (*t*) and as each quarter goes by, you compare it to the ending desired balance of the fund at the end of the year. (*T*)

Question 2

**Environment**

* Fully observable versus partially observable

Fully observable, are when you know how to code and type, but you must read the documentation on the API key to be able to access any data. Blackjack and poker are known as you are able to know the probability of the cards to come next due to the ones laying out on the table now.

* Deterministic versus non deterministic/stochastic

Deterministic - When the feature state of the environment can be predicted, because of the actions that are being taken now.

Non-deterministic - When driving a car, you are driving, but there are so many factors that go into it that are unknown, for example one possibility is having a coolant line blow, or a tire start to go flat. There are just to many outcomes to predicit what will happen.

Stochastic – Specifically refers to when an event can be quantified into a probability chance of something happening.

* Episodic versus sequential

Episodic- Can be explained by the agent’s experience being split into specific episodes. During every episode, the agent gets information, and then takes a single action based off of the information.

Sequential- The agents’ actions will have a long-term effect on the future because of the actions they take now. I am thinking of a chess game. Information is taken in, then the agent must make a decision that will certainly have an effect later in the game.

* Static versus dynamic

Static- environment does not change when the agent is deciding what action they want to take.

Dynamic- The environment will continue to change no matter what the agent is doing.

* Discrete versus continuous

Discrete – The environment, time, and the precepts of the agent only have a few kinds of different conditions.

Continuous – There are an infinite number of different kinds of variables that could be effecting the environment. Changes in the environment can happen and transition very smoothly with no major changes.

**Agent**

Single agent versus Multiagent

Single agent – only one agent is in the environment making decisions, there is no competition, and there is no need for cooperation.

Multiagent - The agents operate on their own paths, with their own tasks, but a shared objective. The agents often co-exist, or sometimes compete depending on the way that the code was written.

**Example Question:**

**Playing Soccer :**

**Answer the following:**

1. Exploring the subsurface oceans of Titan

Partially observable, stochastic, sequential, dynamic, continuous, single agent

1. Shopping for used AI books on the internet

Fully observable, deterministic, episodic, static, discrete, single agent

1. Playing multiple sets (games) in a tennis match

fully observable, stochastic , sequential, dynamic, continuous, multi agent

1. Bidding on a single item at an auction

Fully observable, stochastic, sequential, dynamic, discrete, multi agent

**Question 3**

No a single agent would not be good for this environment. Given that there is no context on weather or not the vacuum cleaner has been trained on the grounds it patrols. With that being said, the actions it takes to clean the room will become repetitive, and redundant. ONLY if the vacuum does not have any understand of where the dirt lays, and the layout of the room.