## **Problem Statement:**

Train the agent to learn and win the card game, Blackjack using the off-policy MC method.

## **Environment**

* Game is played against a fixed dealer
* Game has a replacement or an infinite deck
* Moves:
  + Hit = Player asking for additional card
  + Stick = Player stops asking for the additional card
  + Bust = The sum of all cards exceeds 21
* Score of the cards:
  + Each of the cards Jack, Queen, and King have reward of 10
  + Each ace has a reward of 11 or 1 and is called unstable at 11
* Goal: Acquire cards that add up to 21 and must not go beyond 21.
* Rules:
  + Game starts with one card faced up and one card faced down for the player and the dealer
  + Player can ask for additional cards until the sum of the cards exceed 21 or player stops voluntarily
  + After the player sticks, the dealer will show the facedown card and draw cards from the deck until the sum is 17 or greater
  + After drawing cards, the player wins if the dealer exceeds the allowed sum of 21 and vice versa
  + If neither of them busts, the winner is decided by finding who has a score near to 21
* Action:
  + STICK = 0
  + HIT = 1
* Reward:
  + Win = +1
  + Draw = 0
  + Loss = -1
* Observation:
  + Current sum of players
  + Dealer's one showing card
  + Player having a usable ace or not