Blackjack

```r
# read csv
df <- read.csv2("deck.csv")
```

fix the seed if necessary

```r
set.seed(42)
```

```r
# combine into four full decks
four_full_decks <- rbind(df, df, df, df)
```

Definition of global variables

```r
casino_deck_current <- NULL
dealer_hand <- NULL
my_hand <- NULL
```

Definition of the function shuffle_deck

```r
shuffle_deck <- function (casino_deck) {

  # use the sample function to shuffle deck randomly
  res_casino_deck <- casino_deck[sample(1:nrow(casino_deck)), ]

  return(res_casino_deck)
  }
```

Definition of the function start_game

```r
compute_chances <- function(sum_my_hand, sum_dealer_hand){
  # $$$ COMPUTE CHANCES $$$
  # To compute chances mean to count a probability that next card for you will bring you sum of points
  if ((sum_my_hand >= sum_dealer_hand ) & (sum_my_hand < 22)){
    chances <- 1
  } else {
    distance_to_win <- min(21, sum_dealer_hand) - sum_my_hand
    if(!(distance_to_win %in% casino_deck_current$value)){
        chances <- 0
      }
      else{
      chances <- nrow(casino_deck_current[(casino_deck_current$value == distance_to_win),])/nrow(casino
    }
  }
  return(chances)
  }
```

```r
print_state <- function(my_table, dealer_table){
  sum_my_hand <- sum(my_table$value)
  sum_dealer_hand <- sum(dealer_table$value)

  print_table <- function(who, table, sum){
    names(table) <- NULL
    print(paste(who, "hand:", sep=" "))
    print(table, row.names = F)
    print(paste("sum", sum, sep=" "))
  }
  print("*****************Current state*****************")
  print_table("Dealers", dealer_table, sum_dealer_hand)
  print_table("Your", my_table, sum_my_hand)
  print(paste("chances", compute_chances(sum_my_hand, sum_dealer_hand)*100, "%", sep=" "))
  print("*****************End of current state*****************")

}

start_game <- function() {
  # this function shuffles deck, deals 2 cards for you and dealer. and prints state

  # suffle deck
  casino_deck_shuffled <- shuffle_deck(four_full_decks)

  # tidy up
  # use <<- to overwrite global variables when we are inside a function
  dealer_hand <<- NULL
  my_hand <<- NULL

  # deal first and trird card for the dealer
  dealer_hand <<- casino_deck_shuffled[c(1,3), ]

  # deal first and fourth card for me
  my_hand <<- casino_deck_shuffled[c(2,4), ]

  casino_deck_current <<- casino_deck_shuffled[5:nrow(casino_deck_shuffled),]
  print_state(my_hand, dealer_hand)
}
```

Definition of the function deal

```r
deal <- function() {
  # This function deals you a card and prints state

  # deal a card to me
  my_hand <<- rbind(my_hand, casino_deck_current[1,])

  if(sum(sum(my_hand$value) > 21)){
    stop_game()
  }
  # remove this card from the deck
  casino_deck_current <<- casino_deck_current[2:nrow(casino_deck_current),]
  print_state(my_hand, dealer_hand)
```

```
}
```

Definition of the function stop_game

```r
stop_game <- function(){
  # This function prints result: win or loose

  sum_my_hand <- 0
  sum_dealer_hand <- 0

  for (i in 1:nrow(dealer_hand)) {
    sum_dealer_hand <- sum_dealer_hand + dealer_hand[i,"value"]
  }

  for (i in 1:nrow(my_hand)) {
    sum_my_hand <- sum_my_hand + my_hand[i,"value"]
  }

  # If my card sum more than 21 I lose.
  if (sum_my_hand > 21) {
    print("lose")
  } else if (sum_my_hand >= sum_dealer_hand) { # I win if my card sum is more or equal than dealers car
    print("win")
  } else  {
    print("lose")
  }
}
```

Notice that by the definition of success, I win if my card sum is more or EQUAL than dealers card sum.

Example 1

```r
# Game starts when dealer shuffle all cards and give 2 card for you and 2 for himself.
start_game()
```

```
## [1] "******************Current state******************"
## [1] "Dealers hand:"
##
##  four hearts 4
##  four hearts 4
## [1] "sum 8"
## [1] "Your hand:"
##
##   ace spades 1
##  five  clubs 5
## [1] "sum 6"
## [1] "chances 7.84313725490196 %"
## [1] "******************End of current state******************"
```

```r
deal()
```

```
## [1] "******************Current state******************"
## [1] "Dealers hand:"
##
```

```
##  four hearts 4
##  four hearts 4
## [1] "sum 8"
## [1] "Your hand:"
##
##   ace spades  1
##  five  clubs  5
##  jack hearts 10
## [1] "sum 16"
## [1] "chances 100 %"
## [1] "*****************End of current state*****************"
```

```r
stop_game()
```

```
## [1] "win"
```

Example 2

```r
# Game starts when dealer shuffle all cards and give 2 card for you and 2 for himself.
start_game()
```

```
## [1] "*****************Current state*****************"
## [1] "Dealers hand:"
##
##  queen diamonds 10
##  queen    hearts 10
## [1] "sum 20"
## [1] "Your hand:"
##
##   two hearts 2
##  nine spades 9
## [1] "sum 11"
## [1] "chances 7.35294117647059 %"
## [1] "*****************End of current state*****************"
```

```r
deal()
```

```
## [1] "*****************Current state*****************"
## [1] "Dealers hand:"
##
##  queen diamonds 10
##  queen    hearts 10
## [1] "sum 20"
## [1] "Your hand:"
##
##    two    hearts 2
##   nine    spades 9
##  eight diamonds 8
## [1] "sum 19"
## [1] "chances 7.88177339901478 %"
## [1] "*****************End of current state*****************"
```

```r
deal()
```

```
## [1] "lose"
## [1] "*****************Current state*****************"
```

```
## [1] "Dealers hand:"
##
##  queen diamonds 10
##  queen   hearts 10
## [1] "sum 20"
## [1] "Your hand:"
##
##    two   hearts  2
##   nine   spades  9
##  eight diamonds  8
##   king    clubs 10
## [1] "sum 29"
## [1] "chances 0 %"
## [1] "*****************End of current state*****************"
```

```r
stop_game()
```

```
## [1] "lose"
```

Example 3

```r
start_game()
```

```
## [1] "*****************Current state*****************"
## [1] "Dealers hand:"
##
##  five     clubs  5
##  king diamonds 10
## [1] "sum 15"
## [1] "Your hand:"
##
##  eight     clubs  8
##   jack diamonds 10
## [1] "sum 18"
## [1] "chances 100 %"
## [1] "*****************End of current state*****************"
```

```r
deal()
```

```
## [1] "lose"
## [1] "*****************Current state*****************"
## [1] "Dealers hand:"
##
##  five     clubs  5
##  king diamonds 10
## [1] "sum 15"
## [1] "Your hand:"
##
##  eight     clubs  8
##   jack diamonds 10
##  seven   spades  7
## [1] "sum 25"
## [1] "chances 0 %"
## [1] "*****************End of current state*****************"
```

```
stop_game()
```

[1] "lose"

Example 4

```
start_game()
```

[1] "*****************Current state*****************"
[1] "Dealers hand:"
##
six clubs 6
five hearts 5
[1] "sum 11"
[1] "Your hand:"
##
queen diamonds 10
nine   clubs 9
[1] "sum 19"
[1] "chances 100 %"
[1] "*****************End of current state*****************"

```
deal()
```

[1] "lose"
[1] "*****************Current state*****************"
[1] "Dealers hand:"
##
six clubs 6
five hearts 5
[1] "sum 11"
[1] "Your hand:"
##
queen diamonds 10
nine   clubs 9
queen   spades 10
[1] "sum 29"
[1] "chances 0 %"
[1] "*****************End of current state*****************"

```
deal()
```

[1] "lose"
[1] "*****************Current state*****************"
[1] "Dealers hand:"
##
six clubs 6
five hearts 5
[1] "sum 11"
[1] "Your hand:"
##
queen diamonds 10
nine   clubs 9
queen   spades 10
seven   hearts 7

```

```
[1] "sum 36"
[1] "chances 0 %"
[1] "*****************End of current state*****************"
```

```r
stop_game()
```

```
## [1] "lose"
```