

## HW2\_Alevtina\_Bogoliubova-Kuznetsova

### Black Jack probabilities

In your second homework I want you to model Black Jack classic card game.

You can read rules here: <https://www.officialgamerules.org/blackjack>

We have a csv file with a classic 52 card deck.

Assume that casino has 4 full decks (208 cards).

Game starts when dealer shuffle all cards and give 2 card for you and 2 for himself.

To simplify task dealer will always have 2 cards and only you can get additional cards.

Second thing lets assume that Ace has always 1 point.

You win if your card sum is more or equal than dealers card sum.

If your card sum more than 21 you loose.

Each turn I want you to print game state

```
shuffle_deck <- function(deck){
  random <- sample(1:208, size = 208)
  deck <- deck[random, ]
}

draw_card <- function(hand){
  n <- sample.int(208, 1)
  card <- deck[n,]
  hand <- rbind(hand, card[1:3])
  deck <- deck[-n,]
  return(hand)
}

print_state <- function(p_hand, d_hand, deck){
  d_sum <- sum(d_hand$value)
  p_sum <- sum(p_hand$value)
  cat("Dealer's hand:", fill = T)
  print(d_hand, row.names = F)
  cat(c("sum", d_sum), fill = T)
  cat("Your hand:", fill = T)
  print(p_hand, row.names = F)
  cat(c("sum", p_sum, "\n"))

  if (p_sum >= d_sum & p_sum <= 21){
    chances <- 100
  }
  else if (p_sum > 21){
    chances <- 0
  }
  else {
    max <- 21 - p_sum
    min <- d_sum - p_sum
    cards <- sum(deck$value <= max & deck$value >= min)
    chances <- round(cards/nrow(deck)*100)
  }
}
```

```

    }
    cat("chances:", chances, "%", "\n\n")
}

start_game <- function(p_hand, d_hand, n_deck){
  n_deck <- shuffle_deck(n_deck)

  p_hand <- n_deck[1:2,]
  n_deck <- n_deck[-(1:2),]
  d_hand <- n_deck[1:2,]
  n_deck <- n_deck[-(1:2),]

  print_state(p_hand, d_hand, n_deck)
}

deal <- function(){
  p_hand <- draw_card(p_hand)
  d_hand <- d_hand
  print_state(p_hand, d_hand, deck)
}

stop_game <- function(p_hand, d_hand, deck){
  d_sum <- sum(d_hand$value)
  p_sum <- sum(p_hand$value)
  cat("Dealer's hand:", fill = T)
  print(d_hand, row.names = F, col.names=F)
  cat(c("sum", d_sum), fill = T)
  cat("Your hand:", fill = T)
  print(p_hand, row.names = F, col.names=F)
  cat(c("sum", p_sum), fill = T)
  if (p_sum >= d_sum & p_sum <= 21){
    cat("win")
  }
  else{
    cat("loose")
  }
}

deck <- read.csv('deck.csv')
deck <- deck[rep(seq(nrow(deck)),4),]
p_hand <- data.frame(row.names = c('face', 'suit', 'value'))
d_hand <- data.frame(row.names = c('face', 'suit', 'value'))

```

Game 1:

```
start_game(p_hand, d_hand, deck)
```

```
## Dealer's hand:
##   face    suit value
##   six diamonds    6
##   queen diamonds  10
## sum 16
## Your hand:
##   face    suit value
##   seven clubs    7

```

```
## four hearts      4
## sum 11
## chances: 69 %
```

```
deal()
```

```
## Dealer's hand:
## face    suit value
## six diamonds    6
## queen diamonds  10
## sum 16
## Your hand:
## face    suit value
## seven   clubs    7
## four    hearts   4
## ace diamonds    1
## sum 12
## chances: 46 %
```

```
stop_game(p_hand, d_hand, deck)
```

```
## Dealer's hand:
## face    suit value
## six diamonds    6
## queen diamonds  10
## sum 16
## Your hand:
## face    suit value
## seven   clubs    7
## four    hearts   4
## ace diamonds    1
## sum 12
## loose
```

Game 2:

```
start_game(p_hand, d_hand, deck)
```

```
## Dealer's hand:
## face    suit value
## ten spades    10
## six clubs     6
## sum 16
## Your hand:
## face    suit value
## queen hearts    10
## seven hearts    7
## sum 17
## chances: 100 %
```

```
stop_game(p_hand, d_hand, deck)
```

```
## Dealer's hand:
## face    suit value
## ten spades    10
## six clubs     6
## sum 16
```

```
## Your hand:
##   face   suit value
## queen hearts    10
## seven hearts     7
## sum 17
## win
```