HW2 implementation

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```
deck <- read.csv("deck.csv")
head(deck)
```

```
##    face   suit value
## 1  king spades    10
## 2 queen spades    10
## 3  jack spades    10
## 4   ten spades    10
## 5  nine spades     9
## 6 eight spades     8
```

Game functions

Start game function, initializes the game

```
start_game <- function() {
  game_state <- list(
    deck = shuffle_deck(),
    dealer_hand = c(),
    player_hand = c()
  )
  game_state <- deal(game_state, 2, "dealer_hand", FALSE)
  game_state <- deal(game_state, 2, "player_hand")
  cat("----- GAME START -----\t")
  game_state
}
```

Let's enumerate all cards in the deck and consider only their ordinal numbers afterwards

```
shuffle_deck <- function() {
  sample(rep(1:52, 4))
}

deal <- function(game_state, n, hand, print = TRUE) {
  game_state[[hand]] <- c(game_state[[hand]], game_state$deck[(length(game_state$deck) - n + 1):length(g
  game_state$deck <- game_state$deck[1:(length(game_state$deck) - n)]
  if (print) {
    print_state(game_state)
  }
  game_state
}

print_state <- function(game_state) {
  cat("Dealer:\n")
  dh <- deck[game_state$dealer_hand, ]
  colnames(dh) <- NULL
```

```
  print(dh, row.names = FALSE)
  dealer_sum <- sum(deck[game_state$dealer_hand, "value"])
  print(glue::glue("Dealer sum: {dealer_sum}"))

  cat("You:\n")
  ph <- deck[game_state$player_hand, ]
  colnames(ph) <- NULL
  print(ph, row.names = FALSE)
  player_sum <- sum(deck[game_state$player_hand, "value"])
  print(glue::glue("Your sum: {player_sum}"))

  chance <- chance_to_win(game_state)
  print(glue::glue("Chance to win: {chance}%"))
}
```

Stop game function, stops the game

```
stop_game <- function(game_state) {
  player_sum <- sum(deck[game_state$player_hand, "value"])
  dealer_sum <- sum(deck[game_state$dealer_hand, "value"])
  if (player_sum > 21 || player_sum < dealer_sum) {
    print(glue::glue("You lost, dealer: {dealer_sum}, you: {player_sum}"))
  } else {
    print(glue::glue("You won, dealer: {dealer_sum}, you: {player_sum}"))
  }
}
```

Calculate chances to win

```
chance_to_win <- function(game_state) {
  player_sum <- sum(deck[game_state$player_hand, "value"])

  if (player_sum > 21) {
    return(0)
  }

  rest_deck <- c(game_state$deck, game_state$dealer_hand)
  outer_sum <- outer(deck[rest_deck, "value"], deck[rest_deck, "value"], "+")
  chance = sum(outer_sum <= player_sum) / length(outer_sum) * 100
  return(round(chance, digits = 2))
}
```

Example 1

```
game_state <- start_game()
```

```
## Dealer:
##
##  four diamonds  4
##  king   spades 10
## Dealer sum: 14
## You:
##
##  queen spades 10
##    ten hearts 10
```

```
## Your sum: 20
## Chance to win: 100%
## ----- GAME START -----
```

```
game_state <- deal(game_state, 1, "player_hand")
```

```
## Dealer:
##
##  four diamonds  4
##  king   spades 10
## Dealer sum: 14
## You:
##
##  queen spades 10
##    ten hearts 10
##    two hearts  2
## Your sum: 22
## Chance to win: 0%
```

```
game_state <- deal(game_state, 1, "player_hand")
```

```
## Dealer:
##
##  four diamonds  4
##  king   spades 10
## Dealer sum: 14
## You:
##
##  queen   spades 10
##    ten   hearts 10
##    two   hearts  2
##   five diamonds  5
## Your sum: 27
## Chance to win: 0%
```

```
stop_game(game_state)
```

```
## You lost, dealer: 14, you: 27
```

Example 2

```
game_state <- start_game()
```

```
## Dealer:
##
##    ace diamonds  1
##  queen   spades 10
## Dealer sum: 11
## You:
##
##  six diamonds 6
##  two   hearts 2
## Your sum: 8
## Chance to win: 16.3%
## ----- GAME START -----
```

```
game_state <- deal(game_state, 1, "player_hand")
```

```
## Dealer:
##
##    ace diamonds  1
##  queen   spades 10
## Dealer sum: 11
## You:
##
##  six diamonds 6
##  two   hearts 2
##  six diamonds 6
## Your sum: 14
## Chance to win: 60.56%
```

```
stop_game(game_state)
```

```
## You won, dealer: 11, you: 14
```