Blackjack Candidate Instructions

For your tech assessment, you will write code that can simulate a hand of blackjack. You may use any programming language or framework(s) you think appropriate.

The goal of the game is to get a hand of cards that’s worth as close to 21 points as possible. If a player’s hand goes over 21 points, they have lost.

The player is initially dealt two cards. They may then choose to ‘hit’ (draw a card) or ‘stand’ (stop drawing cards.) If they ‘hit’, then the new card’s value is added to the hand total. If this total exceeds 21, the player is ‘bust’, and loses.

Once all players have finished this process, the highest scoring hand wins.

Your solution should model a single deck of 52 cards:

• Number cards are worth their face value (2-10)

• Jacks, queens, and kings are worth 10 each

• Aces are worth either 1 or 11 (player chooses)

• The suit of the card does not matter.

(These are simplified rules- a full description with gameplay variations can be found at https://en.wikipedia.org/wiki/Blackjack.)

Your submission does not need to be a complete, finished game. It is enough simply to write code that satisfies the scenarios overleaf. The best way to prove your code works is with unit tests (see starter code for an example).

You may additionally choose to make your submission playable or interactive, or extend it beyond these basic scenarios. For example, you might…

• Display the player’s cards (text or graphics)

• Invite player input

• Allow for multiple players

• Allow for multiple hands

• Allow for rule variations

This should not be considered a pass / fail assignment. Your goal is to make your best attempt at the scenarios, and write code that you’re confident discussing at the interview. Good luck!

Scenarios

Scenario 1

Given I play a game of blackjack Game

When I am dealt my opening hand Dealer - deals hand

Then I have two cards Card

Scenario 2

Given I have a valid hand of cards Player - has hand/ validate hand

When I choose to ‘hit’ Player - hits

Then I receive another card Dealer - deals card

And my score is updated Player - Score

Scenario 3

Given I have a valid hand of cards Verify hand

When I choose to ‘stand’ Player - stand

Then I receive no further cards

And my score is evaluated Evaluate score

Scenario 4

Given my score is updated or evaluated Hand - score update/ score evaluated

When it is 21 or less

Then I have a valid hand Valid score <=21

Scenario 5

Given my score is updated

When it is 22 or more

Then I am ‘bust’ and do not have a valid hand Invalid score/bust >=22

Scenario 6

Given I have a king and an ace

When my score is evaluated

Then my score is 21 score evaluation K + A = 21

Scenario 7

Given I have a king, a queen, and an ace

When my score is evaluated

Then my score is 21 score evaluation K + Q + A = 21

Scenario 8

Given that I have a nine, an ace, and another ace

When my score is evaluated

Then my score is 21 score evaluation 9 + A + A = 21

Scenario 9

Given that the game has ended

All cards should be returned to the deck

Then the deck should contain 52 cards

UC1 Create new deck of cards

A new deck of cards containing 52 cards must be created. Each deck must contain 13 cards of each of the four suits Hearts, Diamonds, Spades and Clubs with values Ace, 2, 3, 4, 5, 6, 7, 8, 9 , 10, Jack, Queen and King for each suit. The numeric cards hold their face value, a Jack, Queen and King represent a value of 10 and an Ace represents either a 1 or a 11.

Identifier and name: UC1 Create new deck of cards

Initiator: Dealer

Goal: A new deck of cards is created containing 52 cards

Precondition: There is no deck of cards

Postcondition: A deck of cards exists containing 52 cards

Assumptions: All cards have a unique suit and cardValue, Dealer exists

Main Success Scenario

1. An instance of the deck class is created by the Dealer
2. A new card instance for each suit and value is created containing 13 cards for each of the four suits Hearts, Diamonds, Spades and Clubs and the cardValues Ace, 2, 3, 4, 5, 6, 7, 8, 9,10, Jack, Queen and King. The numeric cards hold their face value 2 to 10, a Jack, Queen and King also represent a value of 10 and an Ace represents either a 1 or a 11.

UC2 Shuffle deck of cards

Taking the deck of cards, when the dealer shuffles the deck of cards the order of the cards should have changed

Identifier and name: UC2 Shuffle deck of cards

Initiator: Dealer

Goal: The deck of cards is shuffled by the dealer

Precondition: Deck has not been shuffled

Postcondition: The order of the cards in the deck is different to the order in the initial deck

Assumptions: The deck exists, All 52 cards are present in the deck, all cards are unique

Main Success Scenario

1. The dealer performs a shuffle on the deck of cards
2. The cards are now in a different order from before the shuffling

UC3 Create new player

When a new player is created they should be given a name and assigned an empty hand which should be responsible for storing cards dealt by the dealer during game play and for calculating the hand score and validating its value.

Identifier and name: UC3 Create new player

Initiator: Dealer

Goal: A new player is created with empty hand

Precondition: The player does not exist

Postcondition: An instance of a player has been created, an instance of a hand has been created and assigned to player

Assumptions: Dealer exists

Main Success Scenario

1. The dealer class creates an instance of a player assigning the a name for that player
2. The player instance on initialization creates an empty hand and assigns it to the player
3. The hand contains no cards
4. The hand score is initialized to zero

UC4 Game setup

To set up the game a dealer must be created, who is then responsible for creating a new deck of cards, and shuffling the cards before the game starts. A number of new players is selected by the user and names given for each. With this information new players are created.

Identifier and name: UC4 Game setup

Initiator: Dealer

Goal: A new dealer instance created, a new deck instance created,

New players created

Precondition: No current game exists

Postcondition: Game has been set up ready for the game to start.

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario

1. The dealer class creates an instance of deck and assigns it to the dealer
2. The dealer class creates a player

UC5 - Deal opening hand/start game (Scenario 1)

The game is started when the dealer shuffles the deck and deals two cards to each of the players

Identifier and name: UC5 Deal opening hand/start game

Initiator: Dealer

Goal: Shuffle the deck and deal two cards to each player

Precondition: player has no cards in hand

Postcondition: Deck has been shuffled, player has two cards in their hand

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario

1. The dealer shuffles the deck of cards
2. The dealer deals two cards to the player

UC6 Calculate score (Scenario 6,7 & 8)

Each time a new card is added to a players’ hand the score for that hand should be calculated. To calculate the score the following rules should be observed: a numeric card holds its face value, a Jack, Queen and King represent a value of 10 and an Ace represents either an 1 or a 11 value (Player chooses). Examples of combination values include a King and Ace equal to 21, a King, Queen and Ace equal 21 and a 9, Ace and Ace equals 21. The suit of the hand does not matter.

Identifier and name: UC6 Calculate score

Initiator: Hand

Goal: To calculate the sum total of the values of each of the cards in the hand

Precondition: The hand contains two or more cards

Postcondition: The sum of the cards values has been correctly calculated

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario (6)

1. The hand contains two cards: a King and an Ace
2. The score calculated equals 21

Alternative Success Scenario (7)

1. The hand contains two cards: a King, Queen and an Ace
2. The score calculated equals 21

Alternative Success Scenario (8)

1. The hand contains two cards: a 9, Ace and another Ace
2. The score calculated equals 21

UC7 Evaluate score (Scenario 4 and 5)

To evaluate the score the following rules should be observed: if a valid score of <=21 is found the game can continue, if an invalid score of >=22 is found the hand is considered to be “bust” and the game is over

Identifier and name: UC7 Evaluate score

Initiator: Hand

Goal: To evaluate the score

Precondition: The hand contains two or more cards

Postcondition: A true (valid <= 21) or false (invalid >= 22) value is returned, if >= 21 hand is

complete

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario (4)a

1. The hand contains two cards: A King and an Ace whose score is 21 and <=21
2. The score evaluates to valid(true)
3. Hand is complete

Alternative Success Scenario (4)b

1. The hand contains two cards: A king and an eight whose score is 18 and <=21
2. The score evaluates to valid(true)
3. Hand is not complete

Alternative Success Scenario (4)c

1. The hand contains three cards: A king, a three and an eight whose score is 21 and <=21
2. The score evaluates to valid(true)
3. Hand is complete

Alternative Success Scenario (5)

1. The hand contains three cards: A King, Queen and six whose score is 26 and >=22
2. The score evaluates to invalid (false)
3. Hand is complete

UC8 - Player hits (Scenario 2)

When a player chooses to hit, if the player's score is valid, the player is dealt another card and the score is updated.

Identifier and name: UC8 Player hits

Initiator: Dealer

Goal: Dealer asks Player if they choose to hit or stand. Player chooses hit and is

dealt another card by the dealer

Precondition: The players hand contains two or more cards, the hands score is valid

Postcondition: If hand not complete (<21) the players: hand contains one additional card,

score is recalculated, score is re-evaluated. Else: no card is dealt.

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario (2)a

1. The hand contains a Nine and a Jack
2. The player chooses to hit
3. The score evaluates to valid(true) and is hand is not complete(Hand value < 21)
4. The dealer deals one additional card to the player
5. A new score is calculated
6. The new score is evaluated

UC9 - Player stands (Scenario 3)

If the players score is valid, when a player chooses to stand then they are dealt no more cards and their score is evaluated

Identifier and name: UC9 Player stands

Initiator: Dealer

Goal: Dealer asks Player if they choose to hit or stand. Player chooses stand and

score is evaluated

Precondition: The players hand contains two cards, the hand score is valid

Postcondition: Hand still contains two cards. Score when evaluated is still valid.

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario (3)

1. The hand contains two randomly dealt cards
2. The score evaluates to valid(true)
3. The player chooses to stand, no new card dealt
4. The score is evaluated (valid)

UC10 - Reset Game (Scenario 9)

When the game has ended, all cards should be returned to the deck from the players hands

The deck should then contain 52 cards and the players hand should contain no cards

Identifier and name: UC10 - Reset Game

Initiator: Dealer

Goal: Dealer retrieves all cards that have been dealt out and returns then to the

deck

Precondition: The players hand contains cards, the deck has less than 52 cards

Postcondition: The players hand contains no cards, the deck contains 52 cards

Assumptions: Dealer exists, Deck and Cards exist, Player and Hand exists

Main Success Scenario (9)

1. The players hand contains two or more cards
2. The deck contains less than 52 playing cards
3. The cards are removed from the players hand
4. The cards are returned to the deck of playing cards
5. The deck contains all 52 playing cards
6. The players hand contains no cards