

ECE 71 – Introduction to Computational Programming

Professor Kriehn – Fall 2017

Extra Credit Project Due By: Mon, Oct 16, 2017, 6:00 PM (Help Session)

EXTRA CREDIT – Blackjack Game

Write a program that plays a simplified dice version of Blackjack. Instead of selecting from a deck of cards, a 13-sided die is rolled to represent a card. The rules of the game for one round, as played against the house, are as follows:

1. A roll randomly selects from the values 2-10 or Jack, Queen, King, or Ace. An Ace always has the value of 11. Jack, Queen, and King all have the value of 10. In other words, with equal probability, a roll selects one of 2, 3, 4, 5, 6, 7, 8, 9, 10, 10, 10, 10, 11. The goal is to achieve point values as close to 21 as possible without going over 21. Achieving a point value of 21 exactly is known as “Blackjack” and instantly wins the game. Otherwise the player with the point value closest to 21 wins.
2. The human player starts with \$100, and can enter a wager. The wager must be positive and must not exceed the amount of money possessed by the player.
3. The player and the house are dealt one roll. Both the card “rolled”, as well as its value shown.
4. The player and the house are dealt a second roll. The player’s card is dealt face up, but the house card is hidden.
5. If both the player and house hit BlackJack within their first two rolls, the player and house both have a Natural Blackjack. In this case, the wager is returned to the player and no one wins.
6. If only the player hits a Natural Blackjack within the first two rolls, the player wins 1.5x his wager. If only the house hits a Natural Blackjack within the first two rolls, the house wins and the player forfeits their wager.
7. If the total of the rolls is 22, either the player and/or the house “busts”. If the player loses, their wager is lost. Whenever a bust occurs, the round is over.
8. If neither the player or house receive a Natural Blackjack or busts, the player has the option to “hit” or “stand”. If the player opts to “hit”, then the player is given another roll. If the total is over 22, the player busts. Otherwise the player can continue to choose to “hit” or “stand”. If the player chooses to “stand”, their turn is over, unless they hit BlackJack, in which case the player wins the round and adds the wager to his earnings.
9. If the player does not hit Blackjack and stands, the house flips the hidden card over and is given an additional roll. If the total point values are less than 17 then the house must continue to “hit”. If the house has a total of 22 or greater than the house “busts”, the player wins the wager, and the round is over. The house must continue to hit until it either “busts” or has a value between 17 and 21.
10. If the house did not “bust”, then its value is compared to the player’s total. If the totals are the

same, then it is a “push” and the player does not win or lose anything. If the house’s total is greater than the player’s, then the player loses the wager. If the player’s total is greater than the house’s, then the player wins the wager.

11. After a round is won or lost, allow the player to repeat the game until the player decides to quit or they run out of money.

Specifications:

Use the following function prototypes to help solve the problem:

```
double getWager(double money);
// Determines an acceptable wager.

void newDeal(int &playerTotal, int &houseTotal,
             int &knownHousePoints);
// Responsible for dealing the first two rounds to the player
// and the house.

void playerTurn(bool &playerBust, int &playerTotal,
                int houseTotal);
// Responsible for dealing cards to the player as long as they
// continue to hit after the first two rounds.

void houseTurn(bool &houseBust, int &houseTotal,
               int playerTotal);
// Responsible for dealing cards to the house as long as the
// house continues to hit after the first two rounds.

void initRNG(void);
// Initializes the random number generator

void dealCard(string &card, int &points);
// Deals a single card and returns the name of the card
// and the point value of the card.
```

Notice the use of reference parameters:

`playerTotal` – stores the total points accumulated by the player during a round.

`houseTotal` – stores the total points accumulated by the house during a round

`knownHousePoints` – stores the hidden point value of the hole card

(the card dealt to the house face down)

`playerBust` – stores a Boolean value that is true if the player busts

`houseBust` – stores a Boolean value that is true if the house busts

`card` – stores the name of the card rolled as a string

`points` – stores the point value of the card rolled as an integer

EXTRA CREDIT: Allow an Ace to take on a value of 1 or 11, as necessary.

EXTRA EXTRA CREDIT: Keep track of the number of cards in each rank that are played, so that 5 Aces, 6 Tens, etc. can never be rolled.

EXTRA EXTRA EXTRA CREDIT: Allow the user to split a pair (two of the same card) into two new hands. In this case you are dealt two or more cards (one for each new hand) and your bet is doubled. This provides two chances to beat the dealer (or lose). A split cannot occur if the player cannot cover the cost of doubling the wager.

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WELCOME TO BLACKJACK

You have \$100.00

Enter a wager: \$50.00

Your wager is: \$50.00

You are Dealt an Ace

House is Dealt a Five

Player Point Total: 11

House Point Total: 5

You are Dealt a Ten

House is Dealt a Hole Card

Player Point Total: 21

House Point Total: 5+

The Player was Dealt a Natural Blackjack.

The Winnings are 1.5x the Wager

You Won: \$75.00

Total Money: \$175.00

Play Again? (Y/N): y

Enter a wager: \$50

Your wager is: \$50.00

You are Dealt a Four

House is Dealt a King

Player Point Total: 4

House Point Total: 10

You are Dealt a Queen

House is Dealt a Hole Card

Player Point Total: 14

House Point Total: 10+

Hit or Stand? (H/S): H

You are Dealt a Seven

Player Point Total: 21
House Point Total: 10+

Blackjack!

You Won: \$50.00
Total Money: \$225.00

Play Again? (Y/N): Y

Enter a wager: \$100
Your wager is: \$100.00

You are Dealt a Four
House is Dealt a Two

Player Point Total: 4
House Point Total: 2

You are Dealt a Three
House is Dealt a Hole Card

Player Point Total: 7
House Point Total: 2+

Hit or Stand? (H/S): s

House Flips Hole Card Over.

Player Point Total: 7
House Point Total: 13

House is Dealt a Seven

Player Point Total: 7
House Point Total: 20

House Wins!

Lost Wager: \$100.00
Total Money: \$125.00

Play Again? (Y/N): N

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