

# Web Development – Mr. Turner

## Project – Thirty One

### **Project Overview**

The game of Thirty One is a Rummy style card game where players compete to build a 3 card hand of the highest value.

Each player is dealt 3 cards.

The remainder of the deck is placed in the middle of the table and the top card is turned over and added, face up, to the discard pile.

The player to the dealer's left goes first.

On each turn, a player can do 1 of 3 things.

- The player may draw the top card from the deck, add it to his/her hand, and discard a card from his/her hand.
- The player may draw the top card from the discard pile, add it to his/her hand, and discard a card from his/her hand.
- The player may "knock", announcing that (s)he has a high enough score to "not lose" the hand.

A player's hand has a value based on the values of the ranks of his/her cards. In order to determine the value of a hand, a player adds up all of the cards of the same suit. Face cards (Kings, Queens, and Jacks) are worth 10 points. Aces are worth 11.

*If a player has the King of Spades, the Two of Spades, and the 4 of Hearts, the value of his/her hand is 12 because the 4 doesn't count.*

*If a player has all different suits, the highest card represents his or her score.*

When a player feels that they have a hand that is not the lowest scoring hand at the table, they can "knock". A knocking player does not take a card. After a player knocks, play continues around the table until it returns to the player who knocked. The hand ends with the player who goes before the player who knocked.

At the end of a hand, each player shows his/her hand and the scores are tallied. The player(s) with the lowest score receives a strike. If the player who knocked has the lowest score they receives 2 strikes. Once a player has three strikes they are eliminated from the game.

If any player has 3 matching cards, their score is 30.

As soon as a player draws a score of 31, the hand ends automatically. Every player except the player with 31 receives a strike.

The last player to be eliminated is the winner.

If the last two people tie to end the game, every player (even players previously eliminated) gets back one strike, including the last two people (so everyone has 1 strike left), and play continues.

### **Display**

The list below includes the essential elements of the page.

- There will be 4 players in the game including 1 human player and 3 computer players.
  - The screen will show the computer hands as cardbacks. If a computer player is eliminated, there should be a red X through the cardback.
  - The player's hand will show along the bottom. It is represented by the player's 3 cards.
  - There will be a display showing how many strike each player has.
- There will be a “knock” button for the player.
- The deck and discard pile will appear in the middle of the screen.
  - The deck will be represented by a cardback image.
  - The discard pile will be represented by it's top card.
- The game will have a reset button.
- The game should have a sufficiently designed display.

### **Functionality**

After all of the cards are dealt out, the deck will be set in the middle of the “table” and the top card flipped over.

The system will choose a “dealer” at random. The next player clockwise has the first turn.

On the player's turn, (s)he can click on the deck, the discard pile, or the knock button.

If the player clicks the knock button, his or her turn ends and play continues with the next player.

If the player clicks on the deck, add the top card from the deck to the player's hand.

If the player clicks on the discard pile, add the top card from the discard pile to the player's hand.

Once the card is in the player's hand, the player must then select something to discard. The player can do this by clicking on any of the 4 cards (s)he's holding. The selected card will move to the top of the discard pile and the player's turn is over.

On the computer's turn, it will choose from the same options.

- The computer will knock if the value of its hand is more than 24.
- The computer will draw from the discard pile if doing so will increase its hand value.
- Otherwise, the computer will draw from the deck.

When choosing a discard, the computer will choose a card that does not decrease its hand value or decreases it by the least amount (if it has 4 of the same suit).

If there are more than 1 card that satisfy the above requirement, the computer will always throw the lowest card **unless** it means breaking up a pair.

*The computer has the 4 of spades, the 8 of clubs, and the queen of hearts. It draws the 4 of clubs, making the value of its hand 12 (with the 8). It now has a choice of dropping the 4 of spades or the queen of hearts. Normally, it would drop the 4, but since it has a pair of 4s, it will instead drop the queen in case another 4 comes up.*

Remember that the human player needs to be able to follow the computer's plays. Make sure you factor that into your programming.

After a player knocks, whether the human or the computer, play proceeds around the table one last time.

***No one else may knock.***

When the turn reaches the player who knocked, that player does *not* take a turn. All cards are shown and scores are revealed. The player(s) with the lowest score get a strike. Any player with 3 strikes is out. If there is only one player remaining, that player is the winner.

If there are still players in the game, the deck is shuffled and another round is played. The “dealer” shifts to the next player clockwise and it starts all over again.

If the human player is eliminated, the game should continue as normal until it ends or (s)he clicks the reset button.

### **Enhancements**

Create some AI players.

- Mr. Caution will never knock unless he has 27 or better. He will never attempt to get 3 of a kind by saving pairs, but if it should happen to fall into his lap, he'll keep it.
- Ms. Aggressive will knock on 20. She will also knock on the first round if she has 16 or better. If she should ever have 2 matching cards in her hand, she will attempt to go for 30, even throwing away higher value. If she has an Ace, she will always wait to try and get 31 (even to the exclusion of knocking on 20).
- The Card Counter knows what opportunities are available. The Card Counter keeps track of the following information.
  - Who is going for what suit. He learns this by watching what players take from the discard pile. If a player takes a card from a particular suit, he will assume

that player is going for that suit. If the same player takes a card from a different suit, he will decide which suit by which card was higher.

- Which cards are unavailable for 30. He knows this by seeing two cards of the same rank appear on the discard pile. He may go for 30 if he draws 2 cards of the same rank, but never if 30 is impossible with that rank.
- The Card Counter will not go for a suit if more than 2 other people are going for it. If he discovers this and he has already started going for the suit, then he will throw it away if his score is less than 15.
- The Card Counter will never throw a card that matches the suit of the player who goes after him *unless he is forced to do so because it helps his hand*.
- The Card Counter will knock based on the following conditions:
  - If it is the 1st or 2nd round, he will knock if he has 18 or better.
  - If it is the 3rd or 4th round, he will knock if he has 24 or better.
  - If it is the 5th or 6th round, he will knock if he has 27 or better.
  - After the 6th round, he will not knock unless he has 28 or better.
- Mr. Clueless decides everything randomly. Mr. Clueless will always flip a coin to determine whether or not he will choose from the deck or the discard pile. He will choose a card randomly to discard. He will never knock unless he has 30 and, of course, wins the hand with a 31.