System Requirements Specifications

Model

- **Cards**
  - F- Card objects that are usable in a chosen game, display the number and suit (have color blind friendly cards)
  - U- Need to be able to be selected and viewed by a player
  - R- Card images should match card data on the backend.
  - P- Card objects will be kept in database to ensure rapid loading time.
  - S- Cards will be tested to be sure they match what is happening on the backend matches what is being displayed by the cards.
- **Table/Play area**
  - F- Cards will be displayed in front of the user organized according to suit and then rank. The backs of the cards of the other players hands will be visible to the player.
  - U- Clicking on a card will highlight it and allow the player to place it in the middle. Only legal plays will be allowed. Clicking a card in hand and then another card will bring the focus to the second card clicked.
  - R- The system will allow for less than a second of latency to adjust for different connections. If the server loses connection to the clients, it will save the current state of the game and wait for reconnection.
  - P- Cards will be stored to keep track of different players' hands. Memory will be handled by the backend and then stored in the frontend to preserve integrity and increase speed.
  - S- Testing will be done to assure games can be played and then extended to smaller details to improve user experience.
- **Points/Score**
  - F- Accurately keep track of points of all players. Pay special attention to special cases (ie Queen of Spades in Hearts).
  - U- Points of all players should be visible
  - R- Ensure points totaled match gameplay rules
  - P- Score will be displayed after every round to keep track of score in an easy way. The window will close immediately after a button is clicked and resume the game.
  - S- Tests will ensure that scores are accurately kept, bids are tracked and calculated correctly, and special scoring rules are kept.
- **Opponents**
  - F- Ability to play with AIs or human opponents
  - U- Different AIs will be capable of different playing abilities to allow higher level players a challenge.
  - R- If a player is disconnected for more than 30 seconds they will be replaced by an AI.
  - P- Connection speeds should be as fast as possible to allow for fluid play

- S- Test playing the game with AI and ensure that full games can be completed. Games with other players will also run to completion with the same results being displayed for all users.

View

- **Navigation Menu**
  - F- allow the user to navigate through the various menus, start games, interact with other players, choose options etc.
  - U- usable through a series of GUIs. Navigation menu will be well named to allow easy navigation.
  - R- We will want to make sure all aspects are functioning correctly, user will interact with this aspect a lot so we want high reliability.
  - P- We also want high efficiency so that the user can navigate the menus easily and rapidly
  - S- It will be easy to test, all the components of the GUI can be tested and monitored.
- **Player controls**
  - F- In game controls that allow the user to play the game. Play will be limited to card selection. Keyboard input will not affect the game.
  - U- A GUI with various in game controls. Cards will be selected by the mouse.
  - R- Clicking functions will be defined to allow smooth play.
  - P- This needs to function efficiently. One move should not take more than half a second to process and execute.
  - S- We should be able to test this component effectively through test games. We will also be on the lookout for bugs that affect game play. Simulate many different situations that could happen.

Controller

- **General card information (shuffling, decks)**
  - F- Shuffle and dealing of the deck. The deck will consist of the normal 52 playing cards.
  - U- Decks will be shuffled randomly after every hand.
  - R- Ensure the deck can't be viewed or predicted by players. The player will only be able to see the cards they were dealt.

    - P- The card information should have quick retrieval for smooth transitions during the game.
    - S- The cards can be checked to ensure that the card information is accurate and also that the deck does not behave in a predictable manner
- **Score information**
    - F- The game will keep track of the player's score as well as the opponents. The rules regarding the score will be stored. Calculates winners and losers.
    - U- Score will be updated as the game is played at the end of every round.
    - R- Calculation of score will be accurate and reliable.
    - P- Efficient calculations that can keep up with the ongoing game.
    - S-During testing we will make sure that as a game is played, the score is accurate. Players who reach a winning score should win.
- **Game rules**
    - F- The game will behave in accordance to the accepted rules of Hearts and Spades. The game will not allow illegal moves.
    - U- A help menu will be available with a brief description of rules to allow the player to see the rules of the game.
    - R- The rules should display every time the button is pressed. The rules will display for Hearts or Spades, depending on which game is currently being played.
    - P- Pressing the buttons will bring up the rules quickly and not allow them to be modified. Very little memory will be used to display rules.
    - S- Testing will include making sure the rules pull up every time the button is clicked and that the correct rules will be displayed depending on which game is being played.
- **AI Logic**
    - F- AI capable of making valid moves. Will also govern a help system that will give a player a hint at the best move they could make.
    - U- AI should be competent enough that the players won't think it is random.
    - R- Have to ensure it doesn't fall into a logic loop.
    - P- Decisions shouldn't take more than a second to calculate.
    - S- Set up some AIs to play each other to see if they can complete the games
- **Server setup**
    - F- Server will allow for several features such as multiplayer, ELO system, login system etc.
    - U-User will be able to connect to server and play with others, view player information etc.
    - R-Server reliability will be important. Server will need to support multiple users at a time.
    - P-Server will also need to perform efficiently and be able to play games, and store and retrieve information rapidly so user is not waiting for a long time.

    - S- Test server under all different states in the game. Server will be sure to keep track of player's connection. Client and server information will be thoroughly tested in all states to be sure that they always contain the same information.
- **Multiplayer functionality**
    - F- Ability to play with other human players.Chat system will be supported.
    - U-Player will be able to select a game to join or host their own game. Will then be able to play with other people
    - R-Games should not disconnect suddenly. Players will need to be replaced by AI's when they drop out.
    - P-A multiplayer game should perform just like a game vs. AI's.
    - S-This will need a lot of attention. During testing there will be checks on the ability to connect and play an entire game of cards.

Storage

- **Login Information**
    - F- Stores user login information to hold their scores and ranking
    - U- Gives players a way to track their statistics
    - R- Only permits users to login with their correct information, and will deny them access without it
    - P- The login process won't take much time and will be stored using a database structure
    - S- The login page can be tested to see if the username and password combinations work properly
- **Player Rank/ELO**
    - F- Give ranks to players based off the ELO system. ELO will be updated after every game.
    - U- Players should be able to see their rank and the rank of others
    - R- Avoid problems with players losing their ranks etc.
    - P- ELO will quickly be updated to the server so that by the time the next game starts, the new ELO will display.
    - S- Can be tested with bots to insure that the ELO system works.