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## Project 2: Test plan

### Unit Testing:

Modules TableSetting, SetVerify, and Hint were tested using the RSpec framework. The file set\_setup.rb was tested without a framework to check whether the first, last, and three of the middle cards were created as desired. The player\_input.rb and main.rb files were not unit tested using a framework because they required all the other modules for functioning. All the test cases pass for Hint and SetVerify. For TableSetting, all the test cases pass when the image-popping method from gen\_table\_image.rb is commented out. When this method is not commented out, the possible failure of some test cases does not imply a bug in TableSetting.

### Integration Testing:

The usage of some modules in others resulted in the consequent “Integration” testing from the RSpec framework unit testing for the modules TableSetting, SetVerify, and Hint. The testing of player\_input.rb and main.rb resulted in systems testing. Hence, there was no incremental integration testing.

### Systems Testing:

#### I) Alpha

The variables to consider:

- Number of players (If 1, play vs computer player.)
- New round or new game or exit
- Difficulty level (easy, medium, hard)
- Number of cards on the table
- Number of sets on the table

Test #	Test conditions	Results
1	Start with 2 players, medium level for each round, do 2 rounds [randomly dealing cards].	OK. Rounds ended when time ran out.
2	Start with 3 players, hard level, do 1 round, new game, 3 players, medium, 2 rounds [randomly dealing cards].	OK.
3	Start with 1 player (with CP), hard level, do 3 rounds [randomly dealing cards].	OK. Hard level with the computer player needs great skills as the time for each turn

		is very short. CP flow as desired.
4	Start with 1 player (with CP), medium level, do 1 round, new game, 2 players, easy, 2 rounds [randomly dealing cards].	OK. For the medium and easy levels, somewhat experienced players might feel like the rounds drag too long.
5	Start with 3 players, hard level, do 1 round, new game, 1 player (with CP), medium level, 2 rounds [randomly dealing cards].	OK. Since last-turn time runs out at the same time as round time, computer player does not get the last point if player doesn't answer correctly. Practically, it does not matter since the player would not get the answer in the last fraction of the turn time.
6	Start with 1 player, hard level, do 1 round, new game, 1 player, hard level, do 3 rounds, new game, 1 player, hard level, do 2 rounds [randomly dealing cards].	OK. Same as above.

The thought process behind the formation of the test cases above was to randomly work with number of players, rounds, and difficulty levels, since testing for every combination is very time-consuming and inefficient.

Test #	Test conditions	Results
7	Start with 1 player, easy level, and the table: [6, 5, 25, 9, 37, 55, 1, 15] (has 8 cards on the table at the beginning), remove [6,5,1], make random.	This case is never possible in an actual game since the cards removed or added are in multiples of 3. When we manually entered this case, the code broke.
8	Start with 1 player, hard level, and the table: [16, 17, 14, 18, 79, 53, 55, 46, 63, 1, 19, 0]. This table has no sets.	The loop where it ensures that at least one set is present, otherwise keeps adding cards randomly, was commented out to manually enter table. The program terminated with an error since no set was present on the table. This error would probably not occur in the game, since the loop checks for the condition.
9	Start with 2 players, hard level, and the table: [16, 17, 14, 18, 79, 53, 55, 46, 63, 1, 19, 0]. This table has no sets.	Loop is commented out as mentioned above. The console asks the player to choose between card #1..0, and then keeps saying

		“Card not valid. Try again:” till time runs out, and then it ends the round.
10	Start with 3 players, hard level, and the table: [29,71,56,59,13,26,54,40,36,79,51,44], remove set [29,40,51], add [11,26,55].	OK. Keys need to be pushed, and not literally assigned to table.

A limitation is that the image is not visible sometimes. It can also be annoying sometimes when the image window minimizes when we try to enter input in the console.

## II) Beta

We asked x ‘friendly’ people to play the game.

Person #	Comments from the person	Bugs Found
1	Hard for beginners. Needs more directions. When image did not appear, it was difficult to play. Text display is not helpful. Easy level hints were very helpful.	N/A
2	Hard mode is hard, hard to use directions in order to enter set. Also, image generation isn’t working out to well when declaring sets	A ‘g’ accidentally left in the code during programming. But fixed!
3	He is hooked.	Image does not display 15 cards. Image window needs to be flexible.