

SOFTWARE UNIT TESTING REPORT

Writing Scissor Paper Rock game using Test Driven Development in Python



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I. Introduction:

In our youth, many of us spent hours playing the game known as "Scissors, Rock, and Paper." At the absolute least, every programmer has spent at least one session playing or running a game or event they developed using their skills. Using the concept of Test-Driven Development, we will construct this little game once again for this project; however, we will do so in a different way.

Objectives:

In this assignment, we will focus on two main objectives below:

1. A mini-game written in python named Scissor Rock Paper game allows the user to compete with the computer.
2. We are using Test-Driven Development approach for developing test cases and the game.

Requirements:

The basic requirements of the game are defined as follows:

- i. The computer randomly picks one of the options of scissors, paper, and rock.
- ii. The player is then given the option to pick/type one of the scissors, paper, and rock options.
- iii. One point is given to the winner.
- iv. The first to get five points wins the game. The total number of rounds played in total will also be displayed.
- v. Once the winner is determined, the player is asked to quit or restart the game
- vi. Players can also quit the game at any time.
- vii. The winning rules are as follows:
 - rock vs paper -> paper wins
 - rock vs scissor -> rock wins
 - paper vs. scissor -> scissor wins.

Automated unit test tools:

PyUnit will be utilized in this project so automated unit testing can be carried out. It is a framework for unit testing that was modeled after JUnit. This Python testing framework is contained within the Python package and is installed automatically.

II. Process:

Test-driven development, sometimes known as TDD, is a process for developing software that combines refactoring with test-first development. To put it another way, we start by writing a test and then proceed to develop just enough code to pass the test.

In most cases, the following steps are taken:

1. Add a test: Create a test case that completely describes the function.
The developer must first understand the features and requirements to create test cases using user stories and use cases.
2. Perform the test cases and ensure that the new test case fails.
3. Make code of the program that passes the test case.
4. Execute the test cases
5. Refactoring code to eliminate code duplication.
6. Repeat the preceding steps until no more new program code, and all test cases are passed.

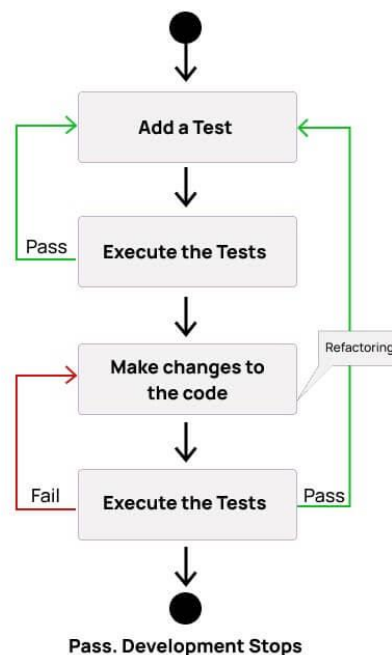


Figure 1: Test-driven development - process flow

Source: *UnitTesting in Python, PRT582 Software Engineering Process and Tools*

Benefits of TDD:

- Unit testing gives continual function feedback.
- The design quality improves, which facilitates proper maintenance.
- Test-driven development protects against bugs.
- TDD ensures that your application satisfies the predetermined requirements.
- TDD has a very short development cycle.

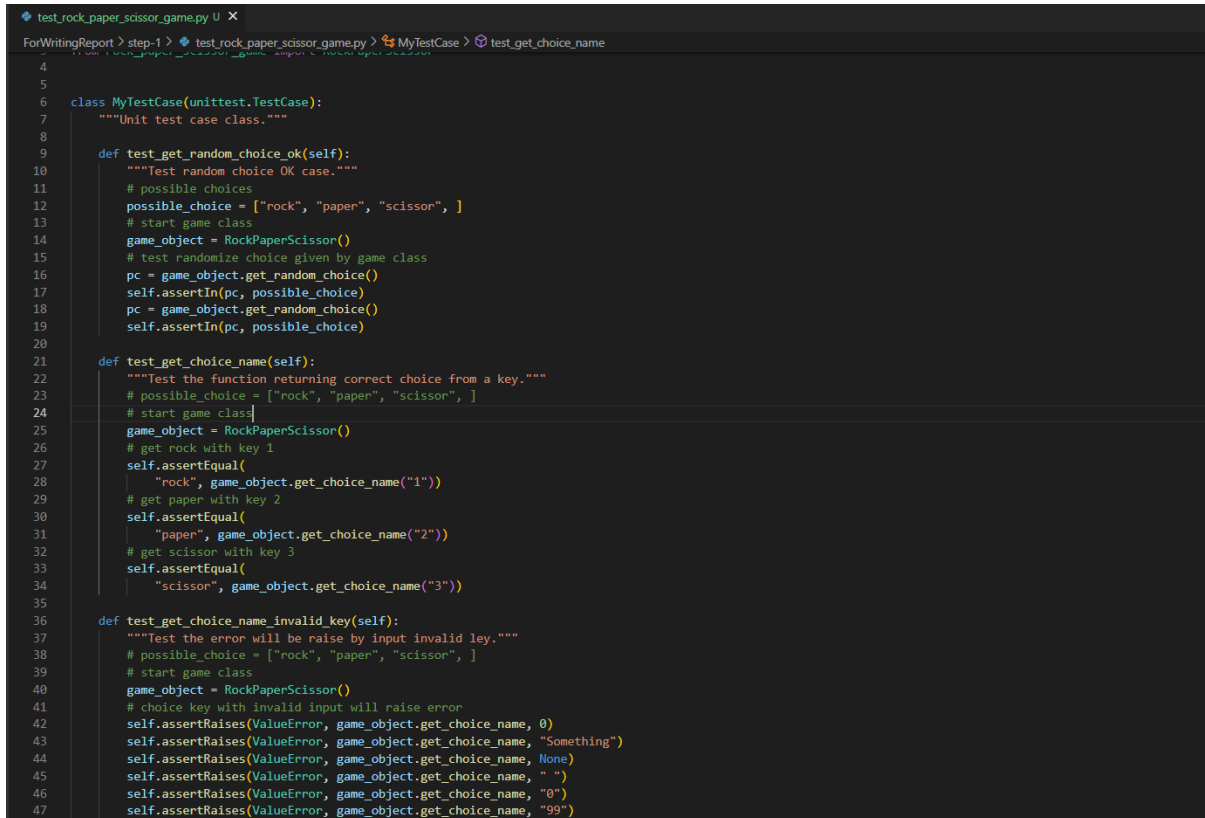
III. Process detail:

We create two python source files, `rock_paper_scissor_game.py`, and `test_rock_paper_scissor_game.py`, for the game and unit test case classes.

- `test_rock_paper_scissor_game.py` contains all the methods based on the user story that may have in a game.
- `rock_paper_scissor_game.py` contains the game class and only the method name without any code.

Step 1: We create some basic test cases for the unit test class inside the unit test case file, as shown in the screenshot below:

- Test method of `RockPaperScissor.get_random_choice`:
 - Requirement: the game class can generate a random choice from a list of [rock, paper, scissor]
 - The unit test case will compare one of the returning results in the list of [rock, paper, scissor] to judge whether it passed or failed.
- Test method of `RockPaperScissor.get_choice_name`:
 - Requirement: the game class should return the choice name base on input numbers such as 1 is rock, 2 is paper, and 3 is scissor.



```
test_rock_paper_scissor_game.py U X
ForWritingReport > step-1 > test_rock_paper_scissor_game.py > MyTestCase > test_get_choice_name
1 from rock_paper_scissor_game import RockPaperScissor
2
3
4
5
6 class MyTestCase(unittest.TestCase):
7     """Unit test case class."""
8
9     def test_get_random_choice_ok(self):
10         """Test random choice OK case."""
11         # possible choices
12         possible_choice = ["rock", "paper", "scissor", ]
13         # start game class
14         game_object = RockPaperScissor()
15         # test randomize choice given by game class
16         pc = game_object.get_random_choice()
17         self.assertIn(pc, possible_choice)
18         pc = game_object.get_random_choice()
19         self.assertIn(pc, possible_choice)
20
21     def test_get_choice_name(self):
22         """Test the function returning correct choice from a key."""
23         # possible_choice = ["rock", "paper", "scissor", ]
24         # start game class
25         game_object = RockPaperScissor()
26         # get rock with key 1
27         self.assertEqual(
28             "rock", game_object.get_choice_name("1"))
29         # get paper with key 2
30         self.assertEqual(
31             "paper", game_object.get_choice_name("2"))
32         # get scissor with key 3
33         self.assertEqual(
34             "scissor", game_object.get_choice_name("3"))
35
36     def test_get_choice_name_invalid_key(self):
37         """Test the error will be raise by input invalid ley."""
38         # possible_choice = ["rock", "paper", "scissor", ]
39         # start game class
40         game_object = RockPaperScissor()
41         # choice key with invalid input will raise error
42         self.assertRaises(ValueError, game_object.get_choice_name, 0)
43         self.assertRaises(ValueError, game_object.get_choice_name, "Something")
44         self.assertRaises(ValueError, game_object.get_choice_name, None)
45         self.assertRaises(ValueError, game_object.get_choice_name, " ")
46         self.assertRaises(ValueError, game_object.get_choice_name, "0")
47         self.assertRaises(ValueError, game_object.get_choice_name, "99")
```

Figure 2: Unit Test Case Class with some first test case

```
test_rock_paper_scissor_game.py U  rock_paper_scissor_game.py X
ForWritingReport > step-1 > rock_paper_scissor_game.py > RockPaperScissor
1  """The mini game Rock Paper Scissor."""
2
3
4  class RockPaperScissor():
5      """The game object of Rock Paper Scissor."""
6
7      possible_choice = ["rock", "paper", "scissor"]
8      player_score = 0
9      computer_score = 0
10     match_round = 1
11     max_round = 5
12     winner_point = 5
13
14     def __init__(self):
15         """Class constructor."""
16
17     def get_random_choice(self):
18         """Get a random choice."""
19
20     def get_choice_name(self, enter_key):
21         """Get choice name from an input key."""
22
23
24     if __name__ == '__main__':
25
26         # Print multiline instruction
27         # perform string concatenation of string
28         print("Welcome to the rock paper scissor game, "
29               "the Winning Rules are as follows: \n"
30               "rock vs paper->paper wins \n"
31               "rock vs scissor->rock wins \n"
32               "paper vs scissor->scissor wins\n")
33
34         # start first game
35         game = RockPaperScissor()
36
```

Figure 3: The main program game class with blank methods

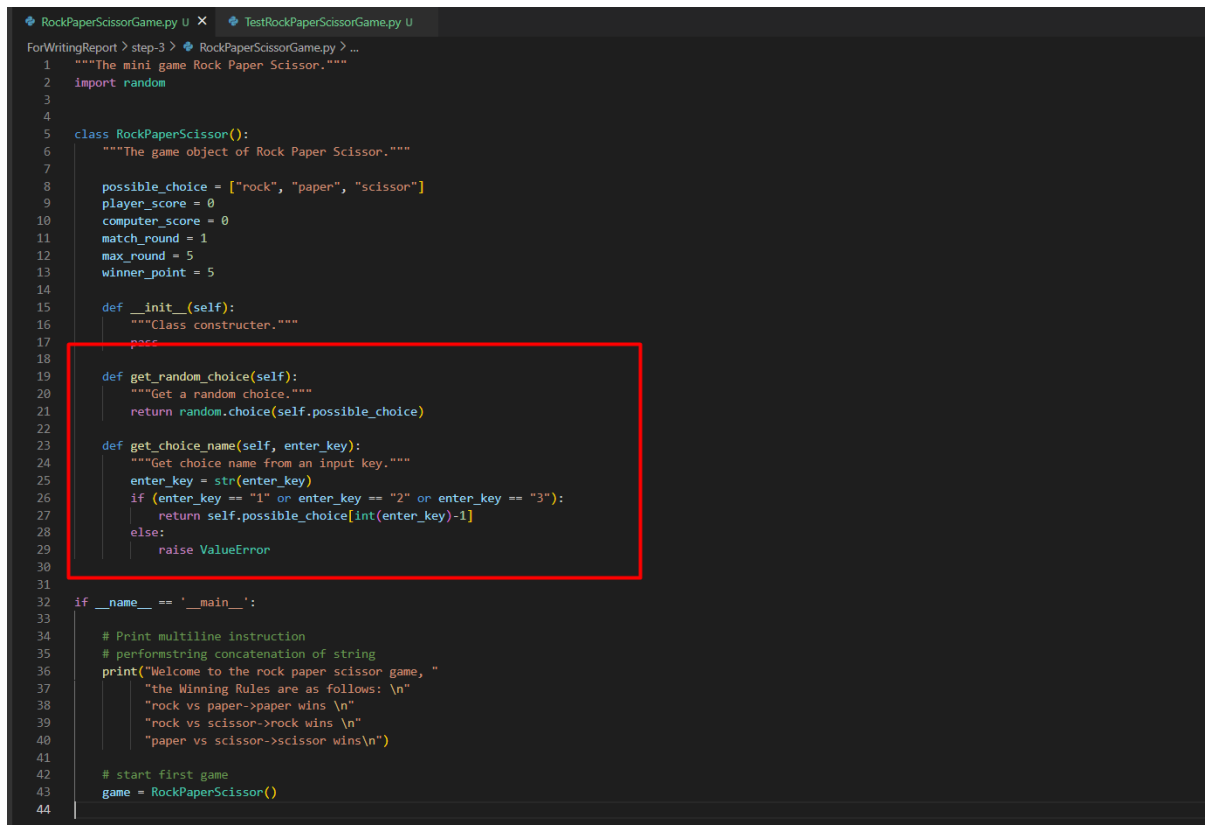
Step 2: We run the test case to see that there should be three failures. Those failures mean there are defined methods in the program class, but its code has not returned any correct result.

```
RockPaperScissorGame.py 2, U  TestRockPaperScissorGame.py U X
ForWritingReport > step-1 > TestRockPaperScissorGame.py > MyTestCase > test_get_random_choice_ok
1  """Unit test for Rock Paper Scissor game."""
2  import unittest
3  from RockPaperScissorGame import RockPaperScissor
4
5
6  class MyTestCase(unittest.TestCase):
7      """Unit test case class."""
8
9      def test_get_random_choice_ok(self):
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Step 3: Make code of the program that passes the test case.

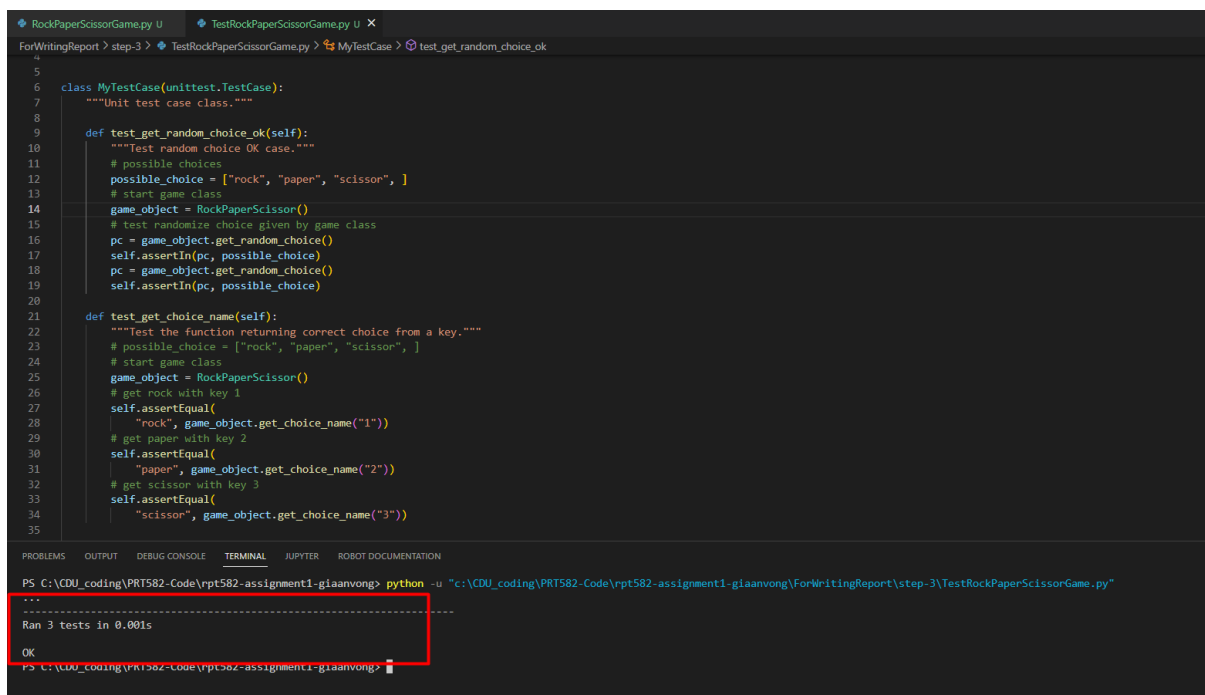
Implement the code to the main program class to ensure the test case are passed.



```
RockPaperScissorGame.py X TestRockPaperScissorGame.py U
ForWritingReport > step-3 > RockPaperScissorGame.py > ...
1 """The mini game Rock Paper Scissor."""
2 import random
3
4
5 class RockPaperScissor():
6     """The game object of Rock Paper Scissor."""
7
8     possible_choice = ["rock", "paper", "scissor"]
9     player_score = 0
10    computer_score = 0
11    match_round = 1
12    max_round = 5
13    winner_point = 5
14
15    def __init__(self):
16        """Class constructor."""
17        pass
18
19    def get_random_choice(self):
20        """Get a random choice."""
21        return random.choice(self.possible_choice)
22
23    def get_choice_name(self, enter_key):
24        """Get choice name from an input key."""
25        enter_key = str(enter_key)
26        if (enter_key == "1" or enter_key == "2" or enter_key == "3"):
27            return self.possible_choice[int(enter_key)-1]
28        else:
29            raise ValueError
30
31
32 if __name__ == '__main__':
33
34     # Print multiline instruction
35     # perform string concatenation of string
36     print("Welcome to the rock paper scissor game, "
37           "the Winning Rules are as follows: \n"
38           "rock vs paper->paper wins \n"
39           "rock vs scissor->rock wins \n"
40           "paper vs scissor->scissor wins\n")
41
42     # start first game
43     game = RockPaperScissor()
44
```

Figure 5: Implement the main program code to fulfill the test case

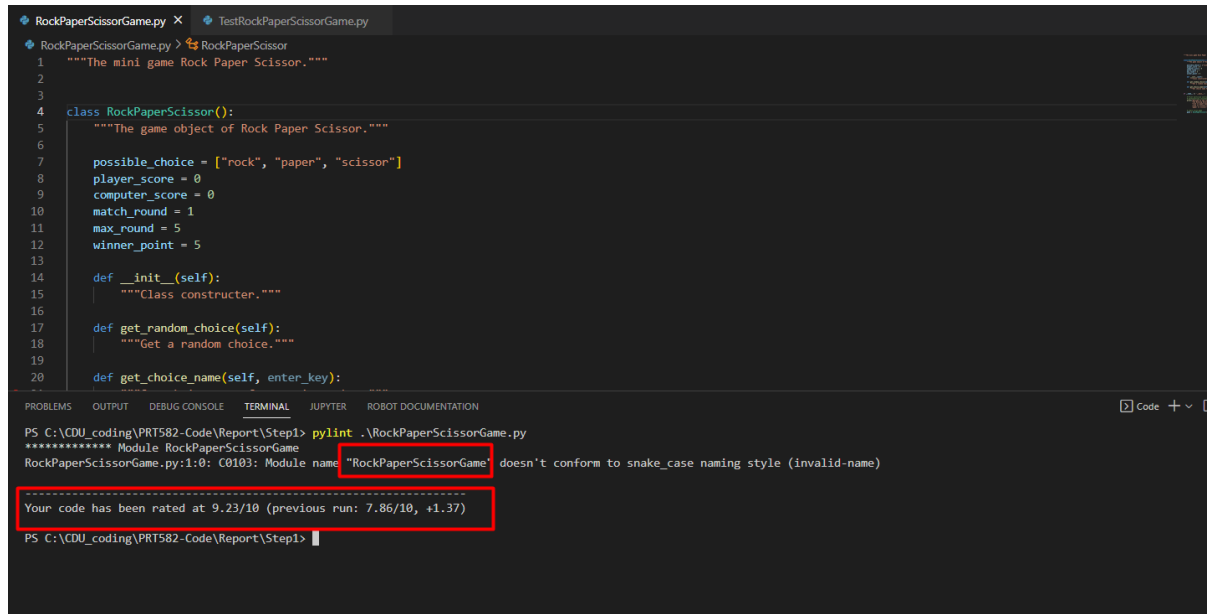
Step 4: Re-run the test case once again to check if the test case is OK.



```
RockPaperScissorGame.py U TestRockPaperScissorGame.py X
ForWritingReport > step-3 > TestRockPaperScissorGame.py > MyTestCase > test_get_random_choice_ok
4
5
6 class MyTestCase(unittest.TestCase):
7     """Unit test case class."""
8
9     def test_get_random_choice_ok(self):
10        """Test random choice OK case."""
11        # possible choices
12        possible_choice = ["rock", "paper", "scissor", ]
13        # start game class
14        game_object = RockPaperScissor()
15        # test randomize choice given by game class
16        pc = game_object.get_random_choice()
17        self.assertIn(pc, possible_choice)
18        pc = game_object.get_random_choice()
19        self.assertIn(pc, possible_choice)
20
21    def test_get_choice_name(self):
22        """Test the function returning correct choice from a key."""
23        # possible_choice = ["rock", "paper", "scissor", ]
24        # start game class
25        game_object = RockPaperScissor()
26        # get rock with key 1
27        self.assertEqual(
28            "rock", game_object.get_choice_name("1"))
29        # get paper with key 2
30        self.assertEqual(
31            "paper", game_object.get_choice_name("2"))
32        # get scissor with key 3
33        self.assertEqual(
34            "scissor", game_object.get_choice_name("3"))
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```


Step 5: Refractory the source code or make the program code clean:

- Removing debug purpose code
- Put more comments to make the program clear
- Valid the source format with **pylint** and **flake8** to get the highest score as much as possible
- Using flake8 in Ms. Visual Studio Code while doing code also reduces the amount of reworking the code.



```
1 """The mini game Rock Paper Scissor."""
2
3
4 class RockPaperScissor():
5     """The game object of Rock Paper Scissor."""
6
7     possible_choice = ["rock", "paper", "scissor"]
8     player_score = 0
9     computer_score = 0
10    match_round = 1
11    max_round = 5
12    winner_point = 5
13
14    def __init__(self):
15        """Class constructor."""
16
17    def get_random_choice(self):
18        """Get a random choice."""
19
20    def get_choice_name(self, enter_key):
```

PS C:\CDU_coding\PRT582-Code\Report\Step1> pylint .\RockPaperScissorGame.py
***** Module RockPaperScissorGame
RockPaperScissorGame.py:1:0: C0103: Module name "RockPaperScissorGame" doesn't conform to snake_case naming style (invalid-name)
Your code has been rated at 9.23/10 (previous run: 7.86/10, +1.37)
PS C:\CDU_coding\PRT582-Code\Report\Step1>

Figure 7: Pylint helps to check coding convention



```
1 """The mini game Rock Paper Scissor."""
2
3
4 class RockPaperScissor():
5     """The game object of Rock Paper Scissor"""
6
7     possible_choice = ["rock", "paper", "scissor"]
8     player_score = 0
9     computer_score = 0
10    match_round = 1
11    max_round = 5
12    winner_point = 5
13
14    def __init__(self):
15        """Class constructor."""
16
17    def get_random_choice(self):
18        """Get a random choice."""
19
20    def get_choice_name(self, enter_key):
```

PS C:\CDU_coding\PRT582-Code\Report\Step1> flake8
.\RockPaperScissorGame.py:5:1: D400 First line should end with a period
PS C:\CDU_coding\PRT582-Code\Report\Step1>

Figure 8: Flake8 helps to validate the coding convention

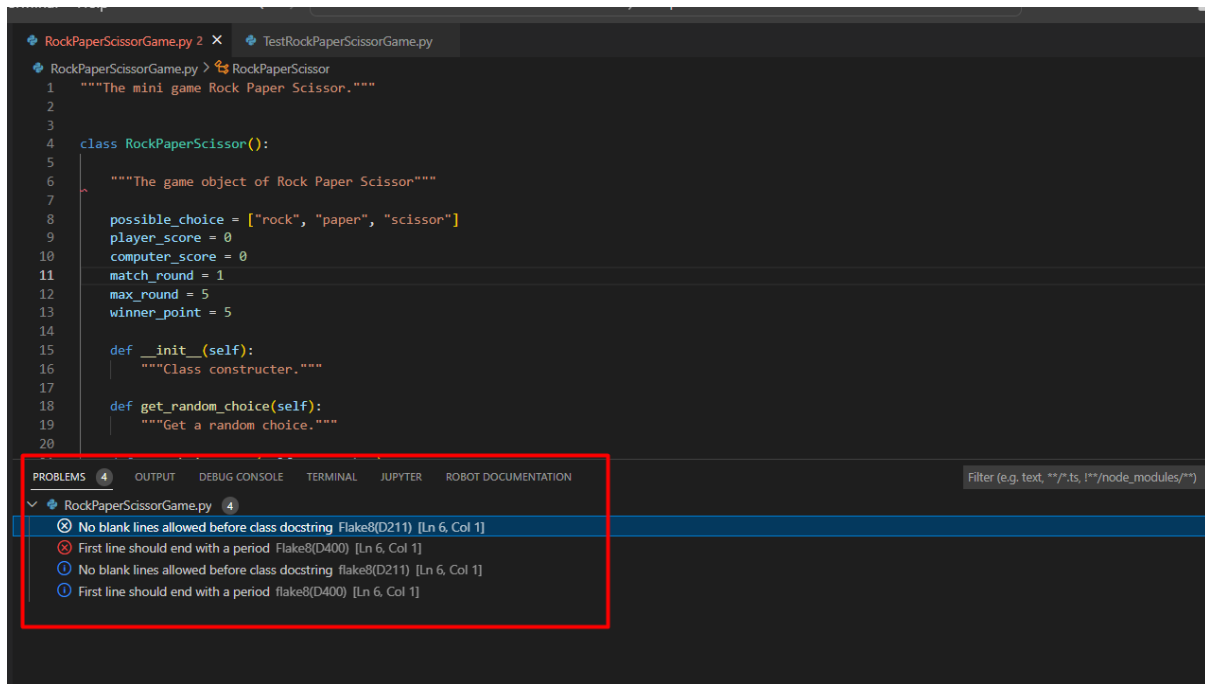


Figure 9: Flake8 plugin in VS Code gives instant feedback on program source code

Step 6: Repeat by adding a new test case into the Unit Test Case class file base on the requirements and new methods correspondingly into the game class source code.

The final test result:

The result, in the end, test case and programming, is all the test cases in the table below should be passed by Automated Unit Test.

No.	Unit test case	Description
1	test_find_winner_choice_player_win	Do the test player the winner
2	test_find_winner_choice_computer_win	Do test computer is the winner.
3	test_find_winner_choice_draw_result	Do test function find winner choice return a draw result.
4	test_find_winner_choice_invalid_input	Do test invalid input to find the winner's choice.
5	test_get_random_choice_ok	Test random choice OK case.
6	test_get_choice_name	Test the function returning the correct choice from a key.
7	test_get_choice_name_invalid_key	Test the error will be raised by inputting an invalid key
8	test_set_round_score	Test the function and set the round score.
9	test_set_round_score_raise_error	Test the function set_round_score raise Error.
10	test_get_game_winner	Test to get the game-winner.
11	test_print_round_result	Test print match round result is True

12	test_print_round_result_error	Test print match round result with error value is raised.
----	-------------------------------	---

Table 1: TDD approach with all game methods must be passed by Unit Test.

Unit test case class and its test result:

```

EXPLORER
  RPT582-ASSIGNMENT1-GIAANVONG
    > __pycache__
    > ForWritingReport
    > .gitignore
    > rock_paper_scissor_game.py
    > Software Unit Testing Report Marking R...
    > Software Unit Testing Report.docx
    > test_rock_paper_scissor_game.py

test_rock_paper_scissor_game.py
1  """Unit test for Rock Paper Scissor game."""
2  import unittest
3  from rock_paper_scissor_game import RockPaperScissor
4
5
6  class MyTestCase(unittest.TestCase):
7      """Unit test case class."""
8
9      > def test_find_winner_choice_player_win(self): ...
26
27      > def test_find_winner_choice_computer_win(self): ...
45
46      > def test_find_winner_choice_draw_result(self): ...
61
62      > def test_find_winner_choice_invalid_input(self): ...
73
74      > def test_get_random_choice_ok(self): ...
85
86      > def test_get_choice_name(self): ...
100
101      > def test_get_choice_name_invalid_key(self): ...
113
114      > def test_set_round_score(self): ...
122
123      > def test_set_round_score_raise_error(self): ...
141
142      > def test_get_game_winner(self): ...
188
189      > def test_print_round_result(self): ...
255
256      > def test_print_round_result_error(self): ...
284
285
286      # main class for unit test
287      if __name__ == '__main__':
288          unittest.main()
289

```

Figure 10: The unit test case full-listed methods

```

EXPLORER
  RPT582-ASSIGNMENT1-GIAANVONG
    > __pycache__
    > ForWritingReport
    > .gitignore
    > rock_paper_scissor_game.py
    > Software Unit Testing Report Marking R...
    > Software Unit Testing Report.docx
    > test_rock_paper_scissor_game.py

test_rock_paper_scissor_game.py
1  """Unit test for Rock Paper Scissor game."""
2  import unittest
3  from rock_paper_scissor_game import RockPaperScissor
4
5
6  class MyTestCase(unittest.TestCase):
7      """Unit test case class."""
8
9      > def test_find_winner_choice_player_win(self): ...
26
27      > def test_find_winner_choice_computer_win(self): ...
45
46      > def test_find_winner_choice_draw_result(self): ...
61
62      > def test_find_winner_choice_invalid_input(self): ...
73
74      > def test_get_random_choice_ok(self): ...
85
86      > def test_get_choice_name(self): ...
100
101      > def test_get_choice_name_invalid_key(self): ...
113
114      > def test_set_round_score(self): ...
122
123      > def test_set_round_score_raise_error(self): ...
141
142      > def test_get_game_winner(self): ...
188
189      > def test_print_round_result(self): ...
255
256      > def test_print_round_result_error(self): ...
284
285
286      # main class for unit test
287      if __name__ == '__main__':
288          unittest.main()
289

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION
OK
PS C:\CDU_coding\RPT582-Code\rpt582-assignment1-giaanvong> python -m unittest -v .\test_rock_paper_scissor_game.py
test_find_winner_choice_computer_win (test_rock_paper_scissor_game.MyTestCase)
Do test computer is the winner. ... ok
test_get_choice_name_invalid_key (test_rock_paper_scissor_game.MyTestCase)
Test the error will be raise by input invalid key. ... ok
test_get_game_winner (test_rock_paper_scissor_game.MyTestCase)
Test get game winner. ... ok
test_get_random_choice_ok (test_rock_paper_scissor_game.MyTestCase)
Test random choice OK. ... ok
test_print_round_result (test_rock_paper_scissor_game.MyTestCase)
Test print match round result. ... You chose [PAPER] vs Computer [ROCK]. Round 1 player won. Player Score: 1, Computer Score: 0
You chose [SCISSOR] vs Computer [PAPER]. Round 2 player won. Player Score: 2, Computer Score: 0
You chose [ROCK] vs Computer [SCISSOR]. Round 3 player won. Player Score: 3, Computer Score: 0
You chose [SCISSOR] vs Computer [SCISSOR]. Round 4 is draw. Player Score: 3, Computer Score: 0
You chose [ROCK] vs Computer [ROCK]. Round 5 is draw. Player Score: 3, Computer Score: 0
You chose [PAPER] vs Computer [PAPER]. Round 6 is draw. Player Score: 3, Computer Score: 0
You chose [ROCK] vs Computer [PAPER]. Round 7 computer won. Player Score: 3, Computer Score: 1
You chose [SCISSOR] vs Computer [ROCK]. Round 7 computer won. Player Score: 3, Computer Score: 2
You chose [PAPER] vs Computer [SCISSOR]. Round 7 computer won. Player Score: 3, Computer Score: 3
ok
test_print_round_result_error (test_rock_paper_scissor_game.MyTestCase)
Test print match round result with error data. ... ok
test_set_round_score (test_rock_paper_scissor_game.MyTestCase)
Test the function set the round score. ... ok
test_set_round_score_raise_error (test_rock_paper_scissor_game.MyTestCase)
Test the function set_round_score raise Error. ... ok
-----
Ran 12 tests in 0.010s

```

Figure 11: Unit Test Case execution result

IV. Conclusion:

Programmers can utilize the development of a Rock Paper Scissors game as a realistic example of programming logic. However, test-driven development is a best practice inside the Agile methodologies paradigm, which accepts requirement modifications and produces less documentation. Developing unit test cases is the best way to define the requirements and verify that all objects and methods are tested. In the scope of this development and report, we concentrated on constructing test cases before implementing the game object's methods. However, some specific requirements, such as business logic, could not be performed by unit testing. This gap can be closed by human interaction with games to determine their correctness.

In conclusion, programming with the TTD methodology is complex, but it brings more benefits to the product outcomes. In addition, in a real-world development environment with several developers, an automated unit test framework can be coupled with other continuous integration/continuous delivery (CI/CD) processes to keep a product to a high-quality standard.

V. APPENDIX

1. Source code on git hub:


<https://github.com/anvong/rpt582-assignment1-giaanvong>

The screenshot shows the GitHub repository page for 'anvong/rpt582-assignment1-giaanvong'. The repository is private and has 0 stars, 1 watcher, and 0 forks. The main branch is 'main'. The repository contains several files and folders, including 'tdd_process_steps', '.gitignore', 'Software Unit Testing Report Markin...', 'Software Unit Testing Report.docx', 'rock_paper_scissor_game.py', and 'test_rock_paper_scissor_game.py'. The files 'rock_paper_scissor_game.py' and 'test_rock_paper_scissor_game.py' are highlighted with a red box. The repository also has a 'README' button and a 'Code' button. The right sidebar shows the 'About' section with no description, website, or topics provided, and the 'Releases' section with no releases published.

File/Folder	Description	Commit
anvong	Adding the tdd_process_steps while doing report	b231b7a 2 days ago 7 commits
tdd_process_steps	Adding the tdd_process_steps while doing report	2 days ago
.gitignore	add .gitignore, rename test case file name	19 days ago
Software Unit Testing Report Markin...	push assignment 1	19 days ago
Software Unit Testing Report.docx	push assignment 1	19 days ago
rock_paper_scissor_game.py	Adding the tdd_process_steps while doing report	2 days ago
test_rock_paper_scissor_game.py	Adding the tdd_process_steps while doing report	2 days ago

2. Game playing and screenshots for each requirement:

Requirement i: The computer randomly picks one of the options of scissor, paper, and rock.



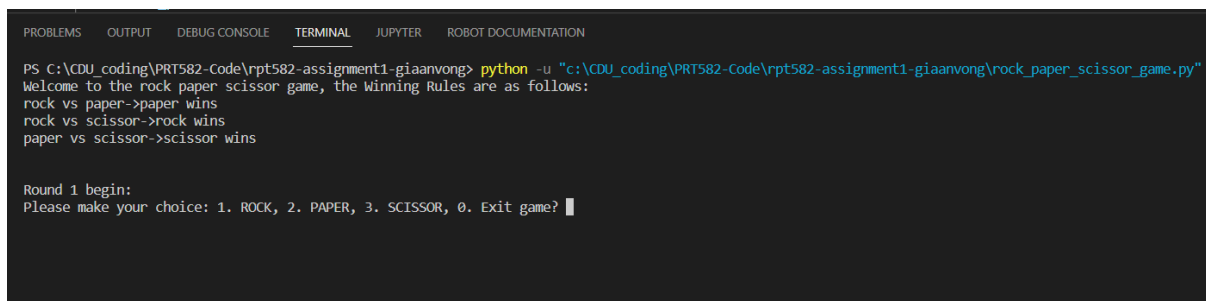
```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION
PS C:\CDU_coding\PRT582-Code\rpt582-assignment1-giaanvong> python -u "c:\CDU_coding\PRT582-Code\rpt582-assignment1-giaanvong\rock_paper_scissor_game.py"
Welcome to the rock paper scissor game, the Winning Rules are as follows:
rock vs paper->paper wins
rock vs scissor->rock wins
paper vs scissor->scissor wins

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 1 computer won. Player Score: 0, Computer Score: 1

Round 2 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? █
```

Figure 12: Find the winner and give the point to him during the entire match round

Requirement ii: The player is then given the option to pick/type one of the scissor, paper, and rock options.

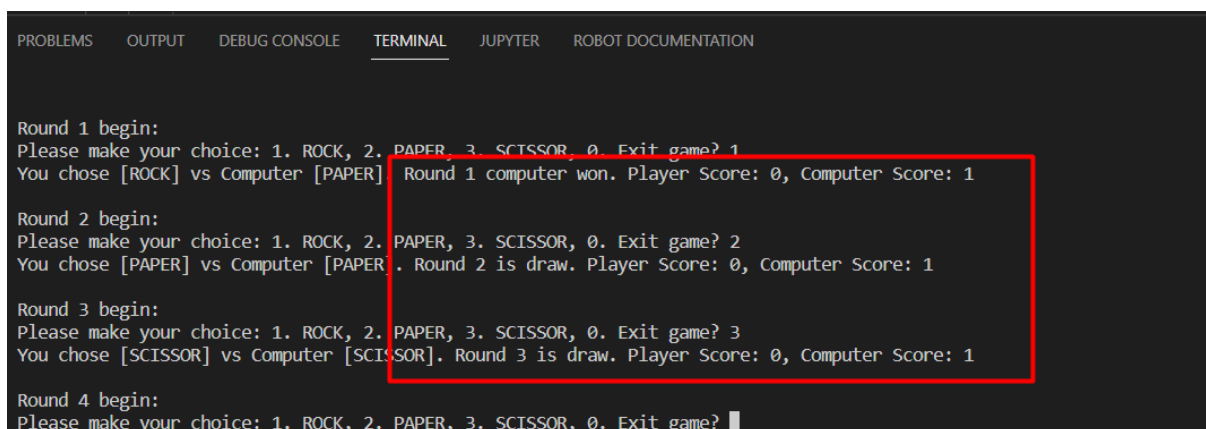


```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION
PS C:\CDU_coding\PRT582-Code\rpt582-assignment1-giaanvong> python -u "c:\CDU_coding\PRT582-Code\rpt582-assignment1-giaanvong\rock_paper_scissor_game.py"
Welcome to the rock paper scissor game, the Winning Rules are as follows:
rock vs paper->paper wins
rock vs scissor->rock wins
paper vs scissor->scissor wins

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? █
```

Figure 13: The user chose an option of Rock, Paper, Scissor

Requirement iii: One point is given to the winner



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 1 computer won. Player Score: 0, Computer Score: 1

Round 2 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [PAPER]. Round 2 is draw. Player Score: 0, Computer Score: 1

Round 3 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [SCISSOR]. Round 3 is draw. Player Score: 0, Computer Score: 1

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? █
```

Figure 14: Try several rounds to check the winning rules and score, adding to the winner

Requirement iv:

- It also shows the current round of the match.

```
Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 1 computer won. Player Score: 0, Computer Score: 1

Round 2 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [PAPER]. Round 2 is draw. Player Score: 0, Computer Score: 1

Round 3 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [SCISSOR]. Round 3 is draw. Player Score: 0, Computer Score: 1

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? █
```

Figure 15: Current round of the match is shown in the game

- Who hits five points first will win the match. The total number of rounds played in total will also be displayed.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [ROCK]. Round 4 computer won. Player Score: 1, Computer Score: 3

Round 5 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 5 is draw. Player Score: 1, Computer Score: 3

Round 6 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 6 player won. Player Score: 2, Computer Score: 3

Round 7 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [PAPER]. Round 7 is draw. Player Score: 2, Computer Score: 3

Round 8 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [PAPER]. Round 8 player won. Player Score: 3, Computer Score: 3

Round 9 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 9 player won. Player Score: 4, Computer Score: 3

Round 10 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [SCISSOR]. Round 10 computer won. Player Score: 4, Computer Score: 4

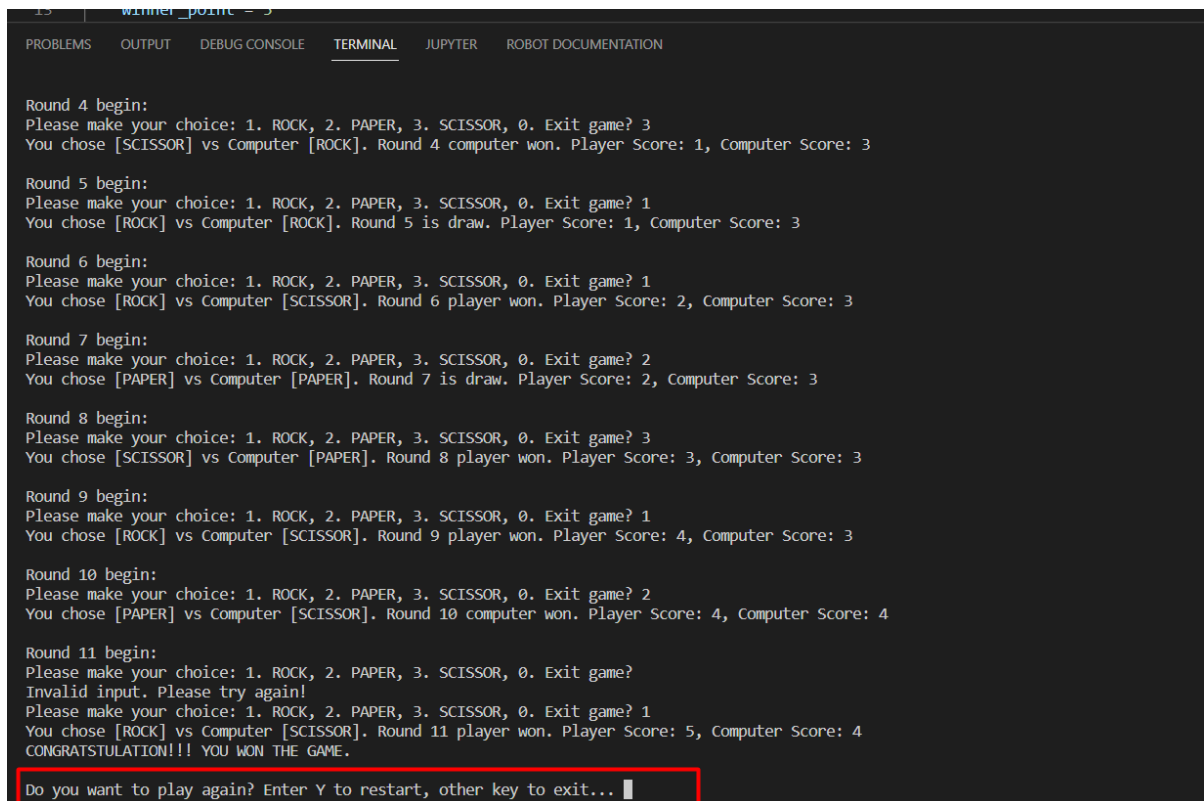
Round 11 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game?
Invalid input. Please try again!
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 11 player won. Player Score: 5, Computer Score: 4
CONGRATULATION!!! YOU WON THE GAME.

Do you want to play again? Enter Y to restart, other key to exit... █
```

Figure 16: The game winner is determined by whom got 5 points first

Requirement v:

- The game match ends when the winner is determined, and the player is asked to quit or restart the game



```
13 | winner_point = 3
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [ROCK]. Round 4 computer won. Player Score: 1, Computer Score: 3

Round 5 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 5 is draw. Player Score: 1, Computer Score: 3

Round 6 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 6 player won. Player Score: 2, Computer Score: 3

Round 7 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [PAPER]. Round 7 is draw. Player Score: 2, Computer Score: 3

Round 8 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [PAPER]. Round 8 player won. Player Score: 3, Computer Score: 3

Round 9 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 9 player won. Player Score: 4, Computer Score: 3

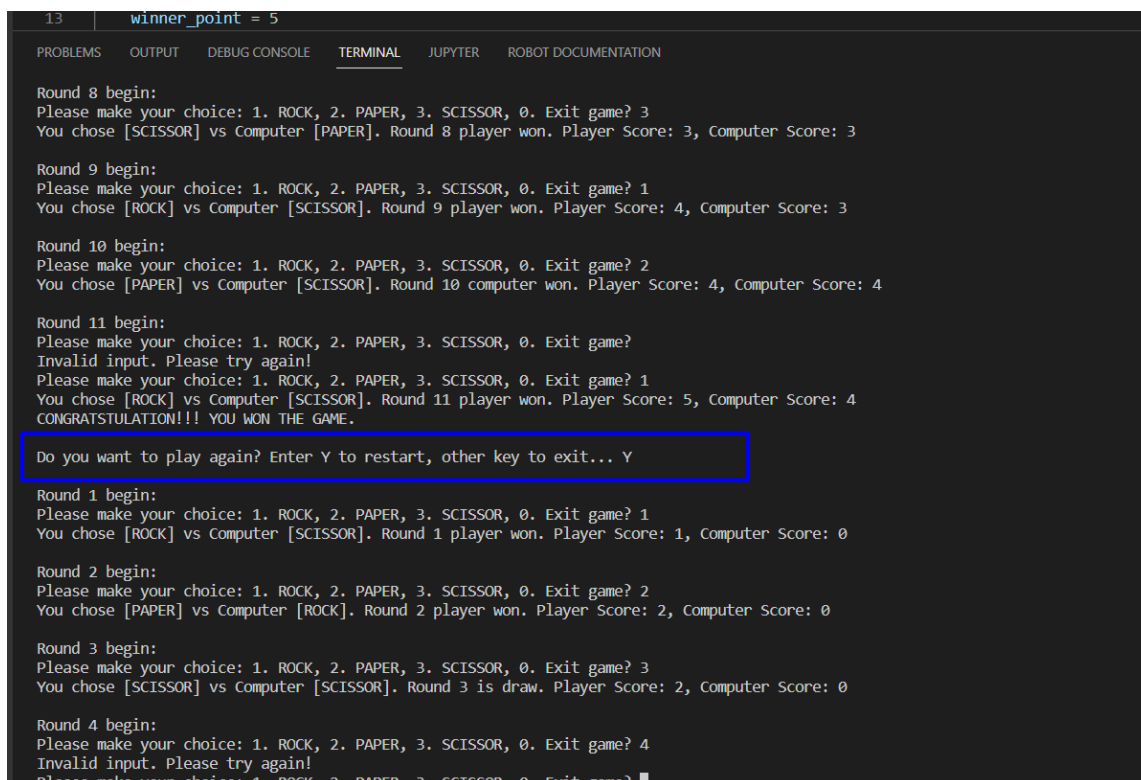
Round 10 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [SCISSOR]. Round 10 computer won. Player Score: 4, Computer Score: 4

Round 11 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game?
Invalid input. Please try again!
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 11 player won. Player Score: 5, Computer Score: 4
CONGRATULATION!!! YOU WON THE GAME.

Do you want to play again? Enter Y to restart, other key to exit... █
```

Figure 17: Ask the user to restart the game once the winner is found

- Restart the game if the user selects Y



```
13 | winner_point = 5
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION

Round 8 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [PAPER]. Round 8 player won. Player Score: 3, Computer Score: 3

Round 9 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 9 player won. Player Score: 4, Computer Score: 3

Round 10 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [SCISSOR]. Round 10 computer won. Player Score: 4, Computer Score: 4

Round 11 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game?
Invalid input. Please try again!
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 11 player won. Player Score: 5, Computer Score: 4
CONGRATULATION!!! YOU WON THE GAME.

Do you want to play again? Enter Y to restart, other key to exit... Y

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 1 player won. Player Score: 1, Computer Score: 0

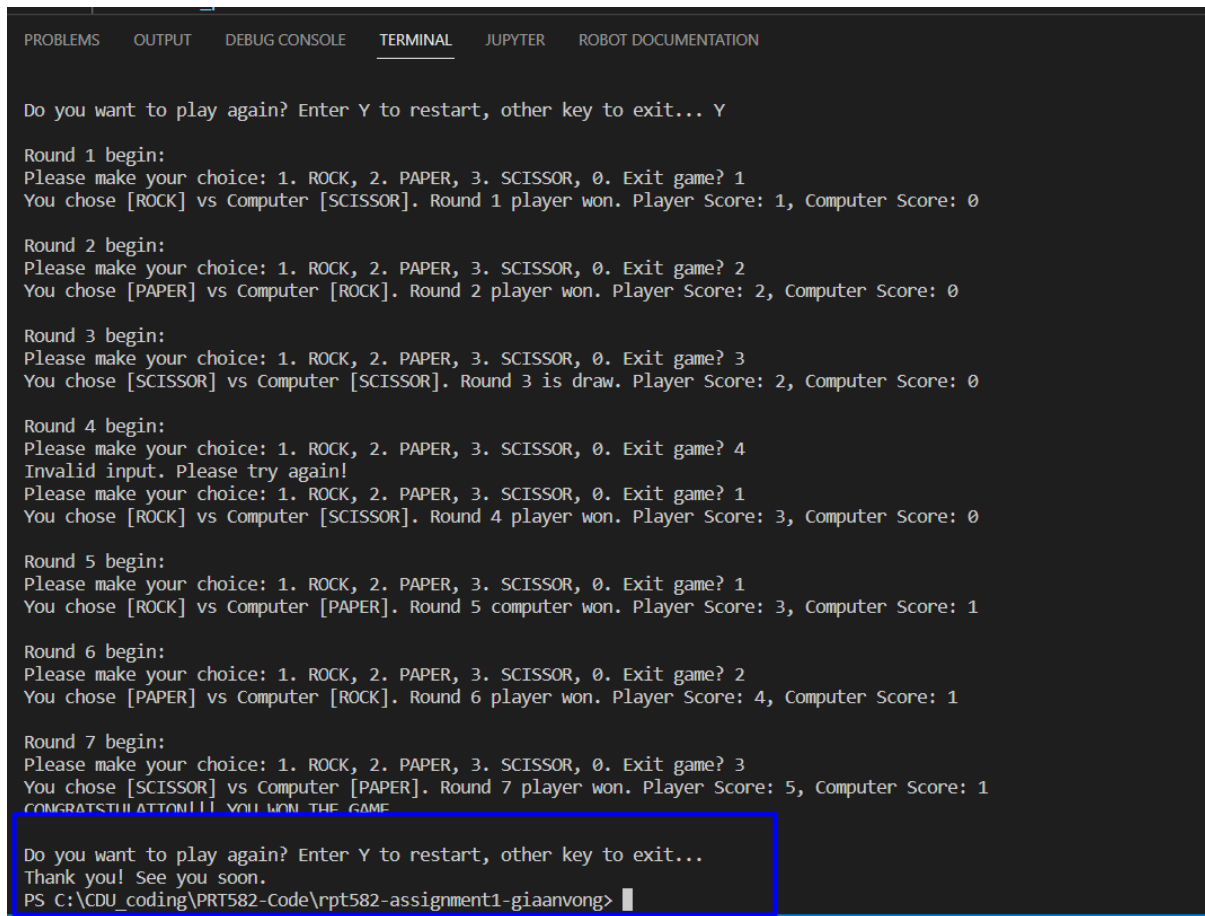
Round 2 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [ROCK]. Round 2 player won. Player Score: 2, Computer Score: 0

Round 3 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [SCISSOR]. Round 3 is draw. Player Score: 2, Computer Score: 0

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 4
Invalid input. Please try again!
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? █
```


Figure 18: Play a new match after the winner is determined.

Or the user decides not to play a new game. Print out the greeting message.



```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  JUPYTER  ROBOT DOCUMENTATION

Do you want to play again? Enter Y to restart, other key to exit... Y

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 1 player won. Player Score: 1, Computer Score: 0

Round 2 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [ROCK]. Round 2 player won. Player Score: 2, Computer Score: 0

Round 3 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [SCISSOR]. Round 3 is draw. Player Score: 2, Computer Score: 0

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 4
Invalid input. Please try again!
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 4 player won. Player Score: 3, Computer Score: 0

Round 5 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 5 computer won. Player Score: 3, Computer Score: 1

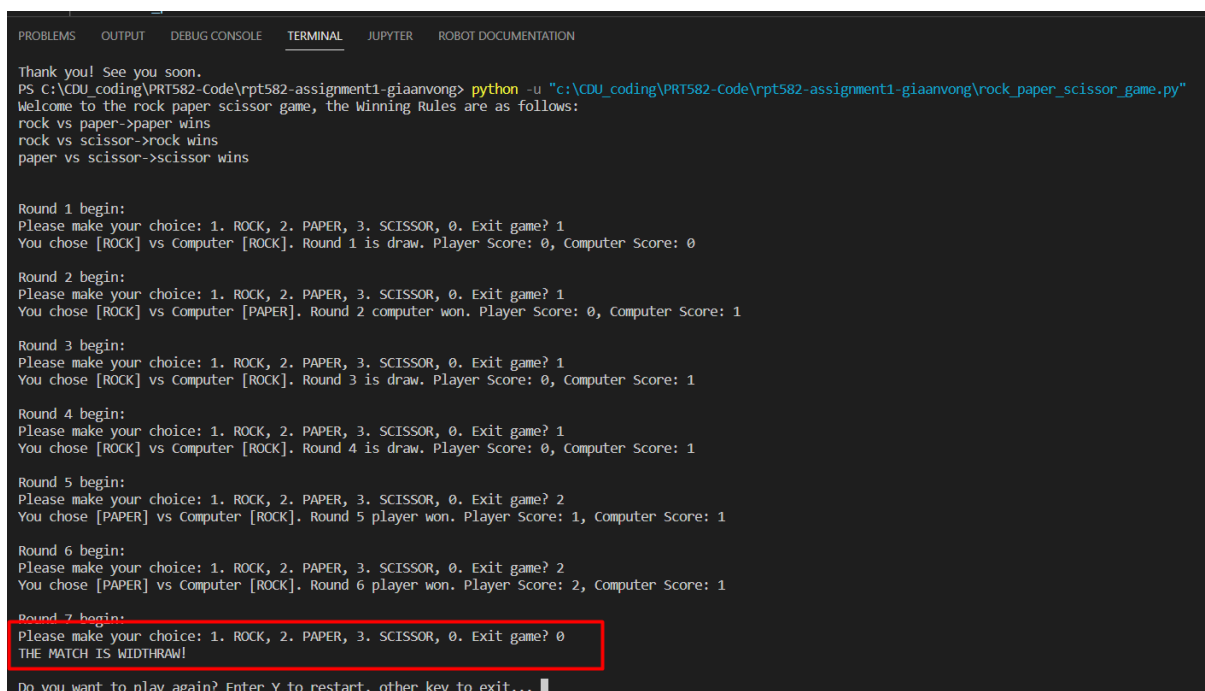
Round 6 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [ROCK]. Round 6 player won. Player Score: 4, Computer Score: 1

Round 7 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 3
You chose [SCISSOR] vs Computer [PAPER]. Round 7 player won. Player Score: 5, Computer Score: 1
CONGRATULATION!!! YOU WON THE GAME

Do you want to play again? Enter Y to restart, other key to exit... Y
Thank you! See you soon.
PS C:\CDU_coding\VRT582-Code\rpt582-assignment1-giaanvong>
```

Figure 19: The user does not start a new game.

Requirement vi: While playing, the user can quit the game at any time by inputting 0



```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  JUPYTER  ROBOT DOCUMENTATION

Thank you! See you soon.
PS C:\CDU_coding\VRT582-Code\rpt582-assignment1-giaanvong> python -u "c:\CDU_coding\VRT582-Code\rpt582-assignment1-giaanvong\rock_paper_scissor_game.py"
Welcome to the rock paper scissor game, the Winning Rules are as follows:
rock vs paper->paper wins
rock vs scissor->rock wins
paper vs scissor->scissor wins

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 1 is draw. Player Score: 0, Computer Score: 0

Round 2 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 2 computer won. Player Score: 0, Computer Score: 1

Round 3 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 3 is draw. Player Score: 0, Computer Score: 1

Round 4 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 4 is draw. Player Score: 0, Computer Score: 1

Round 5 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [ROCK]. Round 5 player won. Player Score: 1, Computer Score: 1

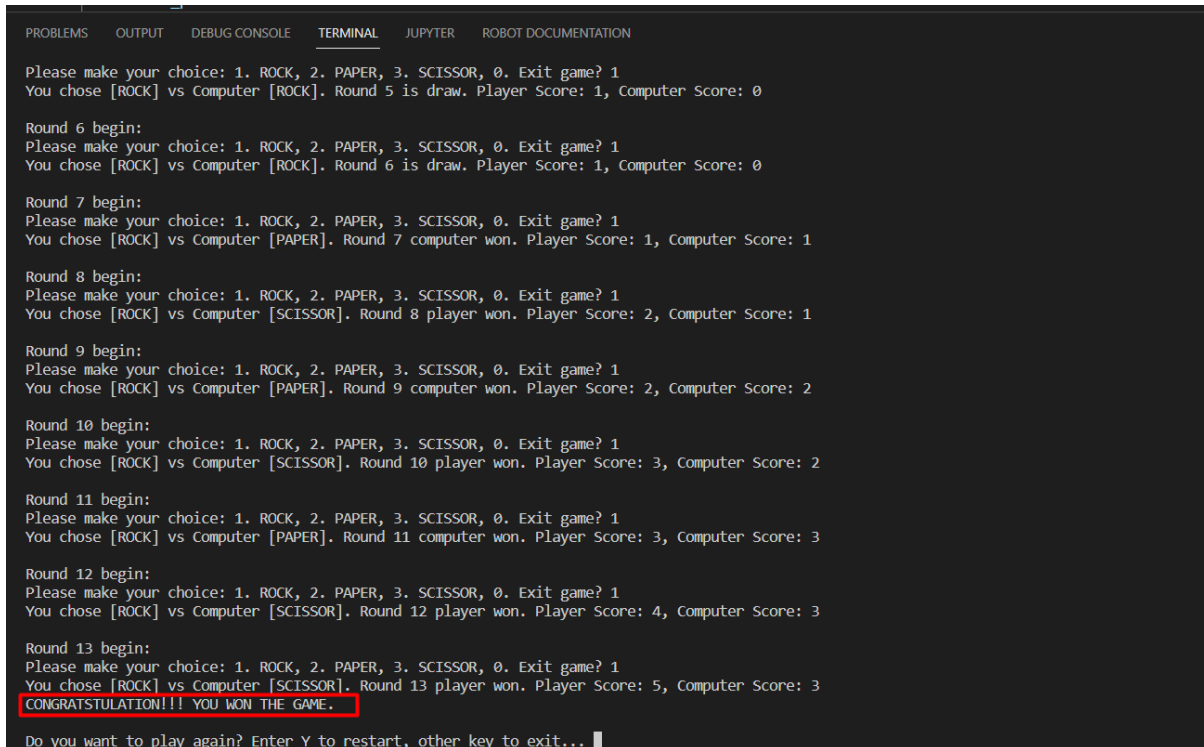
Round 6 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 2
You chose [PAPER] vs Computer [ROCK]. Round 6 player won. Player Score: 2, Computer Score: 1

Round 7 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 0
THE MATCH IS WITHDRAW!

Do you want to play again? Enter Y to restart, other key to exit... Y
```

Figure 20: The user decides to quit the game.

The player won the game by hitting 5 points first.



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION

Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 5 is draw. Player Score: 1, Computer Score: 0

Round 6 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 6 is draw. Player Score: 1, Computer Score: 0

Round 7 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 7 computer won. Player Score: 1, Computer Score: 1

Round 8 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 8 player won. Player Score: 2, Computer Score: 1

Round 9 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 9 computer won. Player Score: 2, Computer Score: 2

Round 10 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 10 player won. Player Score: 3, Computer Score: 2

Round 11 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 11 computer won. Player Score: 3, Computer Score: 3

Round 12 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 12 player won. Player Score: 4, Computer Score: 3

Round 13 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 13 player won. Player Score: 5, Computer Score: 3
CONGRATULATION!!! YOU WON THE GAME.

Do you want to play again? Enter Y to restart, other key to exit... █
```

Figure 21: The player won the game by hitting 5 points first

Requirement vii: The winning rules and point giving.



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER ROBOT DOCUMENTATION

PS C:\CDU_coding\PR582-Code\rpt582-assignment1-giaanvong> python -u "c:\CDU_coding\PR582-Code\rpt582-assignment1-giaanvong\rock_paper_scissor_game.py"

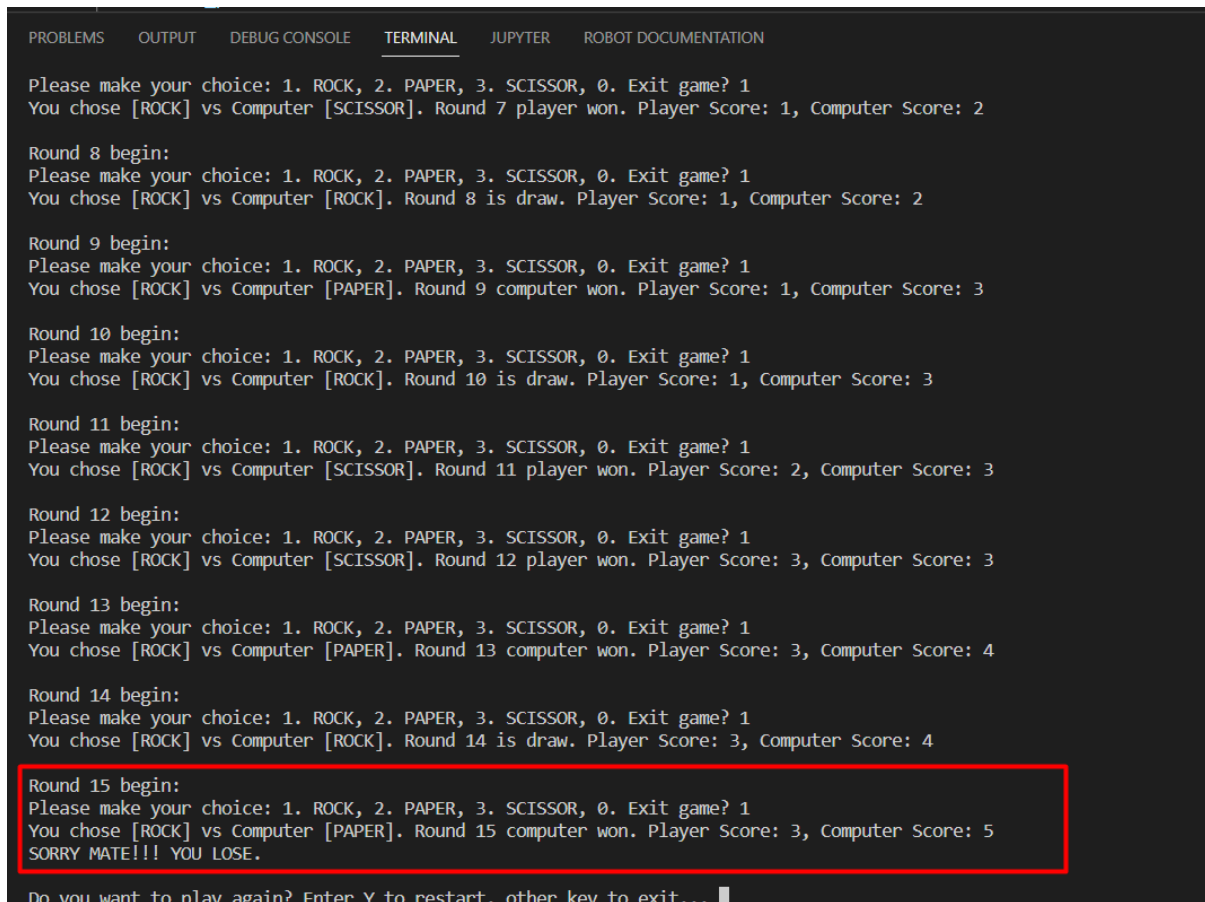
Welcome to the rock paper scissor game, the Winning Rules are as follows:
rock vs paper->paper wins
rock vs scissor->rock wins
paper vs scissor->scissor wins
One point is given to the winner.
The first to get five points wins the game.

Round 1 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? █
```

Figure 22: Winning rules displayed at the beginning of the game

Figure 23: The player won the game.

The player lost the game since the computer hit 5 points first



```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  JUPYTER  ROBOT DOCUMENTATION

Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 7 player won. Player Score: 1, Computer Score: 2

Round 8 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 8 is draw. Player Score: 1, Computer Score: 2

Round 9 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 9 computer won. Player Score: 1, Computer Score: 3

Round 10 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 10 is draw. Player Score: 1, Computer Score: 3

Round 11 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 11 player won. Player Score: 2, Computer Score: 3

Round 12 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [SCISSOR]. Round 12 player won. Player Score: 3, Computer Score: 3

Round 13 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 13 computer won. Player Score: 3, Computer Score: 4

Round 14 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [ROCK]. Round 14 is draw. Player Score: 3, Computer Score: 4

Round 15 begin:
Please make your choice: 1. ROCK, 2. PAPER, 3. SCISSOR, 0. Exit game? 1
You chose [ROCK] vs Computer [PAPER]. Round 15 computer won. Player Score: 3, Computer Score: 5
SORRY MATE!!! YOU LOSE.

Do you want to play again? Enter Y to restart, other key to exit... █
```

Figure 24: The computer won the game