test1.in – Basic play

./straights 9

Upon running the program, there will be prompts to indicate the human/computer player.

```
Is Player 1 a human (h) or a computer (c)?
c
Is Player 2 a human (h) or a computer (c)?
c
Is Player 3 a human (h) or a computer (c)?
c
Is Player 4 a human (h) or a computer (c)?
h
```

This creates 1 human player and 3 computer players. After indicating the player types, the program prints the following:

```
A new round begins.
> It is player 2's turn
Cards on the table
Clubs:
Diamonds:
Hearts:
Spades:
Your Hand: 6S TC TH JH 8S AS 5D AC 3D JC KH 7S QH
Legal plays: 7S
Player 2 plays 7S.
> It is player 3's turn
Cards on the table
Clubs:
Diamonds:
Hearts:
Spades: 7
Your Hand: QC 9S 4H 9C TS 2S 4D 2H 5S TD 7D QS 5H
Legal plays: 7D
Player 3 plays 7D.
> It is player 4's turn
Cards on the table
Clubs:
Diamonds: 7
Hearts:
Spades: 7
Your Hand: AD KD 9H 6D 4C KS 8C 2D QD 3C 4S 6H 3H
Legal plays: 6D
```

We can see that player 2 has the 7 of Spades, so the game starts from player 2 and the play order is 2→3→4→1back to 2. It also prints each player's hand and legal plays and the updated cards on the table each turn. We can see that since player 2 and 3 are computer players, it each played its first legal plays. In each turn, it prints the card that the player played (e.g. "Player 3 plays 7D"). Also, the table updates such that the card a player plays is added.

Since player 4 is a human player, the player must input a command. With the "deck" command, the game displays the deck.

```
deck
7C 7H 3S 2C 5C KC 6C JS AH 8D 9D 8H JD
6S TC TH JH 8S AS 5D AC 3D JC KH 7S QH
QC 9S 4H 9C TS 2S 4D 2H 5S TD 7D QS 5H
AD KD 9H 6D 4C KS 8C 2D QD 3C 4S 6H 3H
```

From this, we can see that each player's hand is listed in the order that appears in the deck. For player 4, the legal plays are 6D, which is an adjacent card of the cards on the table. After player 4 plays 6D, it is player 1's turn.

```
> It is player 1's turn
Cards on the table
Clubs:
Diamonds: 6 7
Hearts:
Spades: 7
Your Hand: 7C 7H 3S 2C 5C KC 6C JS AH 8D 9D 8H JD
Legal plays: 7C 7H 8D
Player 1 plays 7C.
```

We can see that the table has correctly updated to have 6 of Diamonds as well, and it also correctly prints out player 1's legal plays in the order they appear in the deck. Since player 1 is a computer player, it plays the first card in legal plays, which is 7C.

Later in player 4's turn, there are two legal plays: 8C and 4S. Since player 4 is a human player, the program asks for the user input. Also note that the cards that have already been played are removed from the player's hand. In this example, player 4's hand no longer has 6D, which is the card that was played in the first turn and player 4 now has 12 cards in its hand.

```
> It is player 4's turn
Cards on the table
Clubs: 7
Diamonds: 6 7
Hearts:
Spades: 5 6 7
Your Hand: AD KD 9H 4C KS 8C 2D QD 3C 4S 6H 3H
Legal plays: 8C 4S
play 4S
Player 4 plays 4S.
```

Later in player 2's turn, we can see that there are no legal plays. In this case, since player 2 is a computer player, it discards the first card in hand, which is TC. Then, it prints out the player's discarded cards. In player 4's turn, there are also no legal plays. Since player 4 is a human player, an user input must be specified. We can see that human players can discard any card in their hand.

```
> It is player 2's turn
Cards on the table
Clubs: 6 7 8
Diamonds: 5 6 7
Hearts: 6 7
Spades: 3 4 5 6 7 8 9 T
Your Hand: TC TH JH AS AC 3D JC KH QH
Legal plays:
Player 2 discards TC.
Player 2's discards: TC
> It is player 3's turn
Cards on the table
Clubs: 6 7 8
Diamonds: 5 6 7
Hearts: 6 7
Spades: 3 4 5 6 7 8 9 T
Your Hand: QC 4H 9C 2S 4D 2H TD QS 5H
Legal plays: 9C 2S 4D 5H
Player 3 plays 9C.
> It is player 4's turn
Cards on the table
Clubs: 6 7 8 9
Diamonds: 5 6 7
Hearts: 6 7
Spades: 3 4 5 6 7 8 9 T
Your Hand: AD KD 9H 4C KS 2D QD 3C 3H
Legal plays:
discard 9H
Player 4 discards 9H.
Player 4's discards: 9H
```

If a player tries to discard a card when they have a legal play, the program gives an error message. When the player inputs the possible move "play 4C", the program continues.

```
> It is player 4's turn
Cards on the table
Clubs: 5 6 7 8 9
Diamonds: 5 6 7
Hearts: 6 7
Spades: 2 3 4 5 6 7 8 9 T
Your Hand: AD KD 4C KS 2D QD 3C 3H
Legal plays: 4C
discard KS
You have a legal play. You may not discard.
play 4C
Player 4 plays 4C.
```

Also note that the cards that the player has played are removed from the hand and everything is printed in the order that appears in the deck. The cards on the table are listed in the correct order as well.

Later, in player 2's turn, player 2 has no legal plays again, and it discards the first card in its hand TH. It correctly adds the new discarded card to the player's discards.

```
> It is player 2's turn
Cards on the table
Clubs: 5 6 7 8 9
Diamonds: 5 6 7
Hearts: 6 7
Spades: 3 4 5 6 7 8 9 T
Your Hand: TH JH AS AC 3D JC KH QH
Legal plays:
Player 2 discards TH.
Player 2's discards: TC TH
```

Again, in player 4's turn, with the "deck" command, we can see the unchanged deck throughout the game.

```
> It is player 4's turn
Cards on the table
Clubs: 4 5 6 7 8 9
Diamonds: 4 5 6 7
Hearts: 6 7
Spades: A 2 3 4 5 6 7 8 9 T J
Your Hand: AD KD KS 2D QD 3C 3H
Legal plays: 3C
deck
7C 7H 3S 2C 5C KC 6C JS AH 8D 9D 8H JD
6S TC TH JH 8S AS 5D AC 3D JC KH 7S QH
QC 9S 4H 9C TS 2S 4D 2H 5S TD 7D QS 5H
AD KD 9H 6D 4C KS 8C 2D QD 3C 4S 6H 3H
play 3C
Player 4 plays 3C.
```

Player 4 does not have legal plays again, and the card that is specified by the user input is correctly added to the player's discards.

```
> It is player 4's turn
Cards on the table
Clubs: A 2 3 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8 9 T
Hearts: A 2 3 4 5 6 7 8
Spades: A 2 3 4 5 6 7 8 9 T J Q K
Your Hand: KD QD
Legal plays:
discard KD
Player 4 discards KD.
Player 4's discards: 9H KD
```

The game ends after player 1's turn as the game started from player 2. We can see that all cards have been played by looking at the cards on the table and each player's discards. When the round ends, it prints each player's discards and scores, in the format "old score + current score = new score". For example, player 4's old score is 0, as this is the first round, and the current score is 9 + 13 = 22. Player 3 wins the round as it has the lowest score, and after it prints out the winner prompt, it immediately starts a new round because none of the players has exceeded the score limit of 80.

```
> It is player 1's turn
Cards on the table
Clubs: A 2 3 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8 9 T J Q
Hearts: A 2 3 4 5 6 7 8
Spades: A 2 3 4 5 6 7 8 9 T J Q K
Your Hand: KC
Legal plays:
Player 1 discards KC.
Player 1's discards: KC
---------------------------------
Player 1's discards: KC
Player 1's score: 0 + 13 = 13
Player 2's discards: TC TH JH JC KH QH
Player 2's score: 0 + 67 = 67
Player 3's discards: QC
Player 3's score: 0 + 12 = 12
Player 4's discards: 9H KD
Player 4's score: 0 + 22 = 22
---------------------------------
Player 3 wins!
---------------------------------
```

As the new round starts, the deck is now reshuffled, the players have new hands (13 cards), and the cards on the tables are cleared. It starts from player 4 as it has 7 of spades.

```
A new round begins.
> It is player 4's turn
Cards on the table
Clubs:
Diamonds:
Hearts:
Spades:
Your Hand: 6S QH 5S AS 2C 3H JS TC 7S 3S 6D 2S 4H
Legal plays: 7S
deck
6C 4D 9H 7H 5C JD KC 4S QC AC 3D 2H KH
KS 8D TD 7D 2D AD 8S 7C TH 9D 5H 8C QS
8H QD 9C AH 3C KD JH 9S 4C JC 5D 6H TS
6S QH 5S AS 2C 3H JS TC 7S 3S 6D 2S 4H
play 7S
Player 4 plays 7S.
```

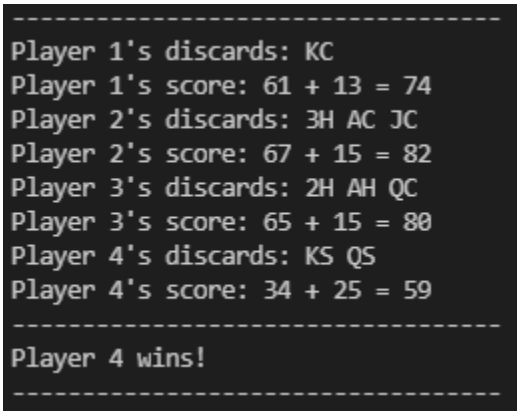
In any part of the game, the players can see the deck with the command “deck”.

```
> It is player 4's turn
Cards on the table
Clubs: 7
Diamonds: 5 6 7 8
Hearts: 6 7 8 9
Spades: 4 5 6 7 8 9
Your Hand: QH AS 2C 3H JS TC 3S 2S 4H
Legal plays: 3S
deck
6C 4D 9H 7H 5C JD KC 4S QC AC 3D 2H KH
KS 8D TD 7D 2D AD 8S 7C TH 9D 5H 8C QS
8H QD 9C AH 3C KD JH 9S 4C JC 5D 6H TS
6S QH 5S AS 2C 3H JS TC 7S 3S 6D 2S 4H
```

It ends after player 3’s turn as the game started from player 4. We can see that each player’s discards are cleared from the last round, and it only contains new discards in the current round. It displays each player’s old scores (scores from last round), the current score gained in this round, and the new score, which is the sum of the old score and current score. For example, in the first round, player 4’s score was 22. In the new round, since its discards are 2C and TC, the current score is 2 + 10 = 12. It displays the new winner of the round, player 4, which has the lowest score. Note that the game has not ended yet because none of the scores exceeded the score limit of 80. Therefore, a new round begins immediately.

```
> It is player 3's turn
Cards on the table
Clubs: 7 8
Diamonds: A 2 3 4 5 6 7 8 9 T
Hearts: 2 3 4 5 6 7 8 9 T J Q K
Spades: A 2 3 4 5 6 7 8 9 T J Q K
Your Hand: JC
Legal plays:
Player 3 discards JC.
Player 3's discards: QD 9C AH 3C KD 4C JC
----------------------------------
Player 1's discards: 6C 5C JD KC QC AC
Player 1's score: 13 + 48 = 61
Player 2's discards:
Player 2's score: 67 + 0 = 67
Player 3's discards: QD 9C AH 3C KD 4C JC
Player 3's score: 12 + 53 = 65
Player 4's discards: 2C TC
Player 4's score: 22 + 12 = 34
----------------------------------
Player 4 wins!
----------------------------------
```

After the next round, the scores are added from the last round. Player 2's new score (82) has exceeded the score limit, and therefore the game ends. It prints the overall winner, player 4, as player 4 has the lowest score.



Throughout the game, the correct legal plays for each player is displayed in correct order and the cards on the table are listed from lowest to highest rank, only including the cards that have been played. The hand and discards of the players are also updated correctly throughout the game.

test2.in - Wrong inputs and quit

./straights 5

If the inputs are not “h” or “c”, the game will give an error message until the player inputs correctly. It is also case insensitive, so users can input capital letters and the game accepts them as correct inputs.

```
Is Player 1 a human (h) or a computer (c)?
h
Is Player 2 a human (h) or a computer (c)?
hello
Please enter "h" or "c".
Is Player 2 a human (h) or a computer (c)?
h
Is Player 3 a human (h) or a computer (c)?
H
Is Player 4 a human (h) or a computer (c)?
C
```

This creates 3 human players and 1 computer player. After indicating the player types, the game begins. In player 2’s turn, the game asks for the inputs.

```
A new round begins.
> It is player 2's turn
Cards on the table
Clubs:
Diamonds:
Hearts:
Spades:
Your Hand: KH 3D JS AC JD 4S KS 5H 2D 4H 7S 3S 8H
Legal plays: 7S
play KH
Illegal play.
play hdfjkljd
Illegal play.
play s7
Illegal play.
play 7S
Player 2 plays 7S.
```

If the player plays a card that is not a part of the legal plays (KH), the program gives an error message. If the card is formatted wrong (s7, hdfjkljd), it also gives an error message. The game continues when the input is valid.

If a player has no legal plays but tries to play a card, the game gives an error. If a player tries to discard a card that does not belong to the player(9D), the game also gives an error message. Also, if the card is not formatted correctly (SJ), the game gives an error.

```
> It is player 2's turn
Cards on the table
Clubs: 7
Diamonds:
Hearts:
Spades: 6 7 8
Your Hand: KH 3D JS AC JD 4S KS 5H 2D 4H 3S 8H
Legal plays:
play 3D
Illegal play.
play 8C
Illegal play.
discard 9D
Illegal play.
discard SJ
Illegal play.
discard JS
Player 2 discards JS.
Player 2's discards: JS
```

Wrong commands (i.e. paly4S) gives another error message: “Unrecognized command.”.

```
> It is player 2's turn
Cards on the table
Clubs: 6 7
Diamonds:
Hearts: 7
Spades: 5 6 7 8
Your Hand: KH 3D AC JD 4S KS 5H 2D 4H 3S 8H
Legal plays: 4S 8H
paly4S
Unrecognized command.
play 8H
Player 2 plays 8H.
```

The commands for cards are case insensitive. The user input can be 4s instead of 4S.

```
> It is player 2's turn
Cards on the table
Clubs: 5 6 7
Diamonds:
Hearts: 7 8 9 T
Spades: 5 6 7 8
Your Hand: KH 3D AC JD 4S KS 5H 2D 4H 3S
Legal plays: 4S
play 4s
Player 2 plays 4S.
```

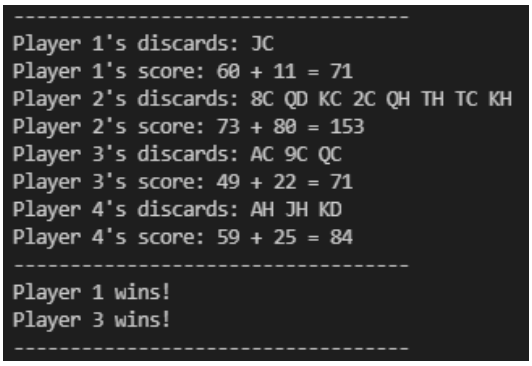
When the player inputs quit, the game immediately ends.

```
> It is player 1's turn
Cards on the table
Clubs: 4 5 6 7
Diamonds:
Hearts: 6 7 8 9 T
Spades: 4 5 6 7 8
Your Hand: AD AS 2S AH 9D 4D 3H TC 3C TS
Legal plays: 3C
quit
yh6choi@ubuntu2004-008:~/cs246/f21/final$
```

test3.in - Multiple winners

./straights 7

In the last round, player 1 and player 3 have the same score and therefore, they are both declared as winners.



test4.in – Ragequit

./straights 11

Start the round with following commands, so that we have 2 human players and 2 computer players.

```
Is Player 1 a human (h) or a computer (c)?
h
Is Player 2 a human (h) or a computer (c)?
c
Is Player 3 a human (h) or a computer (c)?
c
Is Player 4 a human (h) or a computer (c)?
h
```

After the first round is over, the scores are displayed as following.

```
---------------------------------
Player 1's discards: 2H AH
Player 1's score: 0 + 3 = 3
Player 2's discards: KD 3H
Player 2's score: 0 + 16 = 16
Player 3's discards: AD
Player 3's score: 0 + 1 = 1
Player 4's discards:
Player 4's score: 0 + 0 = 0
---------------------------------
Player 4 wins!
---------------------------------
```

After the new round begins, in player 4's turn, player 4 ragequits.

```
> It is player 4's turn
Cards on the table
Clubs: 7
Diamonds: 7
Hearts:
Spades: 7
Your Hand: 2D 6C 9D JH 5C 2C QS 9H 5S KC 6H 6D AH
Legal plays: 6C 6D
ragequit
Player 4 ragequits. A computer will now take over.
Player 4 plays 6C.
```

Then, the program prints out appropriate commands and a computer takes over and plays the card. It correctly follows the rule for computer players (i.e. playing the first card in legal play). After player 4's turn, player 1 still remains a human player and all other players are computer players. Hence, the game will only ask for player 1's inputs. After player 4 ragequits, we can see that it now behaves as a proper computer player.

When the round ends, the scores and the discards are like the following.

```
---------------------------------
Player 1's discards: AS
Player 1's score: 3 + 1 = 4
Player 2's discards:
Player 2's score: 16 + 0 = 16
Player 3's discards:
Player 3's score: 1 + 0 = 1
Player 4's discards:
Player 4's score: 0 + 0 = 0
---------------------------------
Player 4 wins!
---------------------------------
```

We can see that although player 4 changed from a human to computer player, it maintained all the necessary information from the human player. For example, player 4's previous score is correctly saved. At this point, a new round starts because no player's score is greater than or equal to 80. In player 1's turn, player 1 can ragequit as well, and then it will just be computer players. It no longer asks for any other inputs and plays until the game is over.