- ## Design of Class Structures and Their Reasons

  OldMaid, and it's two sub classes VariantOne, VariantTwo host the game, shuffle cards, deal cards.
  And the Player class do what a real player does. They draw cards, drop cards, sort cards.
  I decide to separate into these two kinds of cards because I found out that most differences between variations of OldMaid is in host's behavior, not players'.
  Thus, only the OldMaid has sub classes, and Player doesn't.

- ## How a human player should play with your program for the two variants.

  Run Using make
          make run-1
          make run-2
  Run directly
          java OldMaid 1
          java OldMaid 2
  Special Rules:
  1. Ungguy-Unggyuan
     The card removed is decided randomly, so players don't know which one is the card that may left at the end.
  2. Scabby Queen
     The card removed is Club Queen. At the end of the game, the loser will be punished. Punishment is decided by the card drawn.

- ## How did I test the correctness of my program

  Set Setting.auto=true
  so the program will automatically play game.
  with a large amount of rounds played, I can check the situations of different hands due to randomness.
  I check if the results are right by output all the needed info(cards, payoff, etc.) to a text file, and then use regular expression to search for odd outputs.

● Sample Output for Each Variant of My Program

1. Ungguy-Unggyuan

```
Old Maid - Ungguy-Unggyuan
Deal cards
Player0: H2 S2 H3 H5 S5 C6 D7 S7 C8 C9 HQ SK SA
Player1: C2 D2 H4 S4 D6 C7 H7 H9 C10 DK HK DA HA
Player2: C3 S3 C4 D4 D8 H8 S8 D10 H10 S10 CJ DJ CA
Player3: D3 C5 D5 H6 S6 D9 S9 HJ SJ CQ DQ SQ
Drop cards
Player0: H3 C6 C8 C9 HQ SK SA
Player1: D6 H9 C10
Player2: S8 S10 CA
Player3: D3 SQ
Game start
Player0 draws a card from Player1 D6
Player0: H3 C8 C9 HQ SK SA
Player1: H9 C10
Player1 draws a card from Player2 S8
Player1: S8 H9 C10
Player2: S10 CA
Player2 draws a card from Player3 D3
Player2: D3 S10 CA
Player3: SQ
Player3 draws a card from Player0 SK
Player3: SQ SK
~~~~~~~~~~~~~~~~~~~~trimmed~~~~~~~~~~~~~~~~~~~~
Player0: C8 C10 HQ
Player0 draws a card from Player1 S8
Player0: C10 HQ
Player1: D3 SK
Player1 draws a card from Player2 S10
Player1: D3 S10 SK
Player2: H3 SQ
Player2 draws a card from Player0 C10
Player2: H3 C10 SQ
Player0: HQ
Player0 draws a card from Player1 SK
Player0: HQ SK
Player1: D3 S10
Player1 draws a card from Player2 C10
Player1: D3
Player2: H3 SQ
Player2 draws a card from Player0 SK
Player2: H3 SQ SK
Player0: HQ
Player0 draws a card from Player1 D3
Player0: D3 HQ
Player1:
```

```
Player1 wins
Player2 draws a card from Player0 D3
Player2: SQ SK
Player0: HQ
Player0 draws a card from Player2 SK
Player0: HQ SK
Player2: SQ
Player2 draws a card from Player0 SK
Player2: SQ SK
Player0: HQ
Player0 draws a card from Player2 SK
Player0: HQ SK
Player1: D3 S10
Player1 draws a card from Player2 C10
Player1: D3
Player2: H3 SQ
Player2 draws a card from Player0 SK
Player2: H3 SQ SK
Player0: HQ
Player0 draws a card from Player1 D3
Player0: D3 HQ
Player1:
Player1 wins
Player2 draws a card from Player0 D3
Player2: SQ SK
Player0: HQ
Player0 draws a card from Player2 SK
Player0: HQ SK
Player2: SQ
Player2 draws a card from Player0 SK
Player2: SQ SK
Player0: HQ
Player0 draws a card from Player2 SK
Player0: HQ SK
Player2: SQ
Player2 draws a card from Player0 HQ
Player2:
Player0: SK
Player2 wins
Player0 loses
Game over
```

2. Scabby Queen

Old Maid - Scabby Queen
Deal cards
Player0: S4 C6 H6 S8 C9 D9 S9 C10 D10 S10 HJ HQ CA
Player1: D2 H2 C3 D3 C4 H4 H5 S6 H7 H8 CJ DQ HA
Player2: C2 S2 H3 D4 S5 D6 D7 C8 D8 H9 H10 SK SA
Player3: S3 C5 D5 C7 S7 DJ SJ SQ CK DK HK DA
Drop cards
Player0: S4 S8 S9 S10 HJ HQ CA
Player1: H5 S6 H7 H8 CJ DQ HA
Player2: H3 D4 S5 D6 D7 H9 H10 SK SA
Player3: S3 SQ HK DA
Game start
Player0 draws a card from Player1 H8
Player0: S4 S9 S10 HJ HQ CA
Player1: H5 S6 H7 CJ DQ HA
Player1 draws a card from Player2 H9
Player1: H5 S6 H7 H9 CJ DQ HA
Player2: H3 D4 S5 D6 D7 H10 SK SA
Player2 draws a card from Player3 S3
Player2: D4 S5 D6 D7 H10 SK SA
Player3: SQ HK DA
Player3 draws a card from Player0 CA
Player3: SQ HK
~~~~~~~~~~~~~~~~~~~~~trimmed~~~~~~~~~~~~~~~~~~~~~
Player0: S9
Player0 draws a card from Player1 H9
Player0:
Player1: S6 CJ
Player0 wins
Player1 draws a card from Player2 D6
Player1: CJ
Player2: H10 HJ
Player2 draws a card from Player3 S10
Player2: HJ
Player3: SQ
Player3 draws a card from Player1 CJ
Player3: CJ SQ
Player1:
Player1 wins
Player2 draws a card from Player3 CJ
Player2:
Player3: SQ
Player2 wins
Player3 loses
Player3 is rapped on the back of the hand with the deck 10 times
Game over