**Solution of bug Number: 1**

Change code in Game.java

Before calling function ‘receiveWinnings(winnings)’

Add bet amount to winning amount as under,

‘winnings = bet + winnings;’

So, below is code snippet in Game.java after changing

**if** (matches > 0) {

**winnings = bet + winnings;** //adding bet amount in winning amount

player.receiveWinnings(winnings);

}

**Output after applying solution:**(Snippet of output )

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Turn 1122: Fred bet 5 on ANCHOR

Rolled DIAMOND, ANCHOR, DIAMOND

Fred won 10, balance now 180

Turn 1123: Fred bet 5 on ANCHOR

Rolled DIAMOND, ANCHOR, DIAMOND

Fred won 10, balance now 185

Turn 1124: Fred bet 5 on DIAMOND

Rolled DIAMOND, ANCHOR, DIAMOND

Fred won 15, balance now 195

Turn 1125: Fred bet 5 on CLUB

Rolled DIAMOND, ANCHOR, DIAMOND

Fred lost, balance now 190

Turn 1126: Fred bet 5 on CROWN

Rolled DIAMOND, ANCHOR, DIAMOND

Fred lost, balance now 185

Turn 1127: Fred bet 5 on CLUB

Rolled DIAMOND, ANCHOR, DIAMOND

Fred lost, balance now 180

Turn 1128: Fred bet 5 on ANCHOR

Rolled DIAMOND, ANCHOR, DIAMOND

Fred won 10, balance now 185

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**Solution of bug Number: 2**

Change code in Player.java, function

**publicboolean**balanceExceedsLimitBy(**int** amount) {

**return** (balance - amount > limit);

}

In above code, method ‘return true if balance – amount > limit’ due to which bug occurs, change code as under,

**publicboolean**balanceExceedsLimitBy(**int** amount) {

**return** (balance - amount >= limit);

}

Changing comparison operator from **‘>’** to **‘>=’** solves bug.

**Output after applying solution:**

Start Game 0:

Fred starts with balance 100, limit 0

Turn 1: Fred bet 5 on HEART

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 95

Turn 2: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 90

Turn 3: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 85

Turn 4: Fred bet 5 on HEART

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 80

Turn 5: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 75

Turn 6: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 70

Turn 7: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 65

Turn 8: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 60

Turn 9: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 55

Turn 10: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 50

Turn 11: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 45

Turn 12: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 40

Turn 13: Fred bet 5 on HEART

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 35

Turn 14: Fred bet 5 on CLUB

Rolled CLUB, CLUB, CLUB

Fred won 20, balance now 50

Turn 15: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 45

Turn 16: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 40

Turn 17: Fred bet 5 on CLUB

Rolled CLUB, CLUB, CLUB

Fred won 20, balance now 55

Turn 18: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 50

Turn 19: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 45

Turn 20: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 40

Turn 21: Fred bet 5 on CLUB

Rolled CLUB, CLUB, CLUB

Fred won 20, balance now 55

Turn 22: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 50

Turn 23: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 45

Turn 24: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 40

Turn 25: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 35

Turn 26: Fred bet 5 on ANCHOR

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 30

Turn 27: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 25

Turn 28: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 20

Turn 29: Fred bet 5 on CLUB

Rolled CLUB, CLUB, CLUB

Fred won 20, balance now 35

Turn 30: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 30

Turn 31: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 25

Turn 32: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 20

Turn 33: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 15

Turn 34: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 10

Turn 35: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 5

Turn 36: Fred bet 5 on CLUB

Rolled CLUB, CLUB, CLUB

Fred won 20, balance now 20

Turn 37: Fred bet 5 on HEART

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 15

Turn 38: Fred bet 5 on CROWN

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 10

Turn 39: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 5

Turn 40: Fred bet 5 on DIAMOND

Rolled CLUB, CLUB, CLUB

Fred lost, balance now 0

40 turns later.

End Game 0: Fred now has balance 0

Win count = 5, Lose Count = 35, 0.13

**Output of bug Number: 3**

Start Game 0:

Fred starts with balance 100, limit 0

Turn 1: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 110

Turn 2: Fred bet 5 on CLUB

Rolled ANCHOR, CLUB, ANCHOR

Fred won 10, balance now 115

Turn 3: Fred bet 5 on HEART

Rolled ANCHOR, CLUB, ANCHOR

Fred lost, balance now 110

Turn 4: Fred bet 5 on CLUB

Rolled ANCHOR, CLUB, ANCHOR

Fred won 10, balance now 115

Turn 5: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 125

Turn 6: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 135

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Turn 307: Fred bet 5 on CLUB

Rolled ANCHOR, CLUB, ANCHOR

Fred won 10, balance now 170

Turn 308: Fred bet 5 on DIAMOND

Rolled ANCHOR, CLUB, ANCHOR

Fred lost, balance now 165

Turn 309: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 175

Turn 310: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 185

Turn 311: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 195

Turn 312: Fred bet 5 on ANCHOR

Rolled ANCHOR, CLUB, ANCHOR

Fred won 15, balance now 205

312 turns later.

End Game 0: Fred now has balance 205

Win count = 132, Lose Count = 180, 0.42