CSE D Loop invariant and conditional

1. Consider a shopping outlet company that offers five categories of card to people. The card type can be allotted based on the bill value amount. [CO2,CO4] {DL2}[10 marks]

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| --- | --- |
| Total Points | Category\_CardType |
| 1 to 10000 | Bronze |
| 10001 to 20000 | Silver |
| 20001 to 40000 | Gold |
| 40001 to 60000 | Diamond |

* 1. Write a C program to assign a card type for a person based on his/her total points. (3)
  2. Find the weakest precondition for a person to get a Gold card. (4)
  3. For the input condition (points = 45000), check the validity of the WP in alt-ergo. (3)

1. Derive the weakest precondition for the given program code using Loop Invariants. Derive and verify the intraloop, exit loop and start conditions. Verify them in altergo. [CO2,CO4]{DL3}[15 marks]

s=1; i=1;

while(i<=n){

i = i + 1;

s = s + i\*i\*i;

}

1. Trace out the program state and identify a loop invariant. (3 marks)
2. Use intra-loop VC and Exit-VC to check whether the loop invariant is weakest precondition for the given while loop. State the start VC for an appropriate pre-condition . (9 marks)
3. Verify the correctness of the program in alt-ergo. (3 marks)