**Question 1 of 2**

There are n coins in a line, heads and tails in random order. On each move, one can turn over any number of coins laying in succession. Design an algorithm to turn all coins heads up in the minimum number of moves.

**Question 2 of 2**

How many moves are required in the worst case?

**Solution:**

The minimum number of moves needed to solve the puzzle in the worst case is **ceil(n/2)**.

We can think of the coin line as composed of alternating blocks of heads and tails, where a block may have as few as one coin and as many as n coins of the same type. Flipping any number of successive coins can decrease the number of tail blocks by no more than 1 since ﬂipping more than one such block also ﬂips all the head blocks between them. Therefore, the number of moves needed to get to the zero tail blocks must be at least as large as the number of tail blocks in the initial line. \*\*That number may be as small as zero (in a line of all heads) and as large as ceil(n/2) (in a line of alternating tails and heads that starts with a tail). \*\*

An algorithm that solves the puzzle in the minimum number of moves can simply ﬂip all the coins in the ﬁrst tail block in the current line until no tails are left; it will need **ceil(n/2)** iterations in the worst case.

**Code:**

* #include <iostream>
* using namespace std;
* int main()
* //cpp code which returns number of moves as output
* {
  + int i, n;
  + cout<<"Enter the number of coins in the line: \n";
  + cin>>n;
  + int count=0; //count = number of moves needed to turn all coins heads up
  + char arr[n];
  + cout<<"Enter T or H to assign Tail or Head respectively for all ";
  + cout<<n;
  + cout<<" coins with spaces: \n";
  + for(i=0;i<n;i++)
    - {
    - cin>>arr[i];
    - }
  + for(i=0;i<n-1;i++)
    - {
    - if(arr[i]=='T' && arr[i+1]=='H')
    - count++;
    - }
  + if(arr[n-1]=='T') count++;
  + cout<<"The number of moves to turn all coins heads up: ";
  + cout<<count;
  + return 0;
* }
* //count = 0 if all coins are heads
* //count = ceil(n/2) if coins are placed alternating tails and heads that starts with a tail