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## Heads and Tails

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### Problem Description

This is a problem about rearranging certain items according to certain rules. In our problem we will use coins or small disks.

Rules:

- you must always move two touching coins
- you must finish with all the coins touching in a horizontal line
- only horizontal moves are allowed
- you are not allowed to rotate the coins

N.B. any movement of coins is a move!

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### Task

1. Given three heads followed by three tails in a line, what is the minimum number of moves to alternate the heads and tails?
2. Try the same task with three heads followed by two tails.
3. In a suitable notation, write down your solutions.
4. Write a program to find the number of moves to alternate  $n$  heads and  $n$  tails for  $2 < n < 20$ . Print each step on a new line in an easily readable format.
5. Extend your program to handle  $n$  heads and  $n - 1$  tails.

How well does your solution scale?

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### Relates to Objectives

1.2 1.3 2.1 2.2 2.3 2.4 2.5 2.7 2.9 2.10 3.3 3.4 4.1 4.2 4.7 4.8

( Pair)