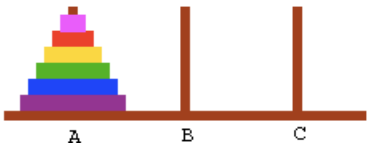
LAB S07 – DISKS OF DATANG (AND MORE RECURSION)

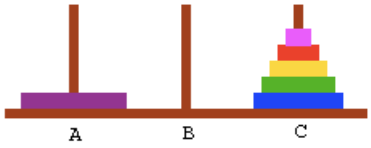
The **Disks of Datang** is a famous problem based on an old myth from the Far East. In the puzzle, there are three pegs, with several disks on the first peg. The disks are arranged in order of decreasing diameter, with the largest disk on the bottom and the smallest disk on top. The rules of the puzzle require that only one disk may be moved at a time, from one peg to another, and that a larger disk may never be placed on top of a smaller disk. The objective is to move the entire tower of disks from the first peg to the second peg. According to the myth, when a group of monks solves the Disks of Datang puzzle with 100 disks, the world will come to an end.

To solve this puzzle, note that the process consists of three steps to move *N* disks from peg A to peg B. If there are any disks to be moved:

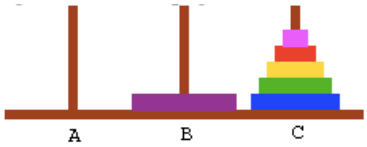
Step 1: move *N*-1 disks from peg A to peg C.
Step 2: move the bottom disk from peg A to peg B
Step 3: move *N*-1 disks from peg C to peg B



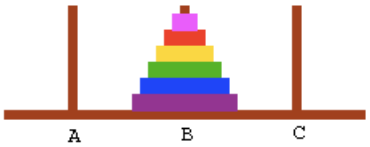
Starting Position



Step 1



Step 2



Step 3

ASSIGNMENT (3 methods)

1. Write a recursive method that solves the Disks of Datang puzzle for a specified number of disks. The definition of this method is:

```
public void datang(int numDisks, char from, char to, char extra)
// method prints out the sequence of moves to move numDisks from from to
   to using extra as a temporary holding place.
// Moves should be displayed in the following format:
    Move #5: disk from peg A to peg C
```

Your main program should call datang as follows:
datang(5, 'A', 'B', 'C'); //prints the solution to a 5 disk Disks of Datang puzzle

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2. Write a recursive method `isPalindrome` that returns `true` if its `String` parameter is a palindrome.

```
public boolean isPalindrome( String str )
```

3. Write a recursive method `isAlphabetical` that returns `true` if its `String` parameter has all of its letters in alphabetical order.

```
public boolean isAlphabetical( String str )
```

Criteria

1) Each method must be recursive.
2) Pre and post conditions must be included for each of these methods

Submission

1) Submit your code for this lab on a Googly Doc by Thursday, February 27th at 11:59 pm. Alternatively, you may show your lab to Holm in class before the due date. ***If you submit through Canvas, you must provide a sample output.***