Course: Math 1332 Contemporary Mathematics
Semester: Fall 2021
Class: Case Study: Polya's Problem-solving strategy. Hanoi Tower. SUDOKU
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Objectives

- Use Polya's Four-Step Problem-Solving Strategy to solve real-life problems
- Understand the Tower of Hanoi problem
- Finding a strategy to solve SUDOKU puzzle

George Polya (1887–1985) was of the foremost recent mathematicians to make a study of problem solving. The basic problem-solving strategy that Polya advocated consisted of the follow- ing four steps.

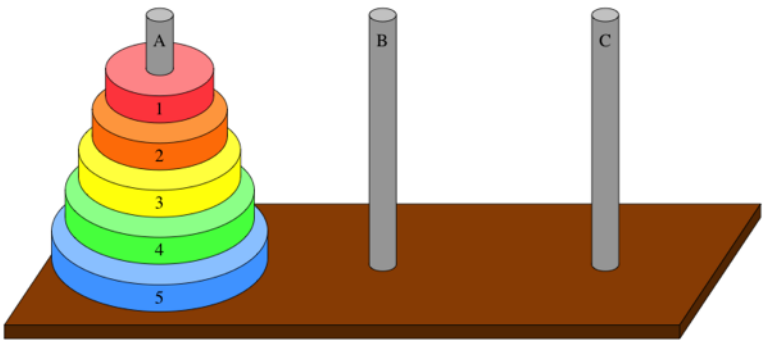
Polya's Four-Step Problem-Solving Strategy

- Understand the problem.
- Devise a plan.
- Carry out the plan.
- Review the solution.

Let use the Polya's Four-Step Problem-Solving Strategy to try to solve two real-life problems: The Tower Hanoi problem and the SUDOKU puzzle

The Tower of Hanoi

The Tower of Hanoi consists of three pegs and a number of disks of distinct diameters stacked on one of the pegs such that the largest disk is on the bottom, the next largest is placed on the largest disk.



The object of the puzzle is to transfer the tower to one of the other pegs. The rules require that only one disk be moved at a time and that a larger disk may not be placed on a smaller disk. All pegs may be used.

Exercise

Define a strategy to solve the Tower of Hanoi with 2 disks, then extend such strategy to solve the Tower of Hanoi problem with 3 disks.

Strategy

Let us assyme that we want to move n disks from the peg A to the peg C, and we known how to move $n-1$disks, so we can do the following:

1. Move the $n-1$ disks on the top from the peg A to the peg B,
2. Move the n disk (the last one) from peg A to peg C, and finally,
3. Move the $n-1$ disks on the top from the peg B to the peg C over the biggest disk.

We can make a program (Lab 9) to solve the Tower of Hanoi following the above strategy.

SUDOKU Puzzle

The objective of the SUDOKU puzzle is to complete the grid such as one must fill each square of the grid with a digit from 1 to 9 so that each row, each column, and each 3×3 subgrid contains the digits 1 through 9 (and so no digit is repeated).

5	3			7				
6			1	9	5			
	9	8					6	
8				6				3
4			8		3			1
7				2				6
	6					2	8	
			4	1	9			5
				8			7	9

We use the Polya's startegy to develope a program to solve any SUDOKu puzzle (Lab 10).

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