

2020-08-02 - Handout – Recursion Algorithms

Method: Base Condition – Hypothesis – Induction

Q1. Reverse a stack

<https://www.geeksforgeeks.org/reverse-a-stack-using-recursion/>

Write a program to reverse a stack using recursion. You are not allowed to use loop constructs like while, for.etc, and you can only use the following ADT functions on Stack S:

isEmpty(S)
push(S)
pop(S)

Q2. Tower of Hanoi

<https://www.geeksforgeeks.org/c-program-for-tower-of-hanoi/>

Tower of Hanoi is a mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

- 1) Only one disk can be moved at a time.
- 2) Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
- 3) No disk may be placed on top of a smaller disk.

Method: Recursion Tree

Q3. Print all combinations of balanced parentheses

<https://www.geeksforgeeks.org/print-all-combinations-of-balanced-parentheses/>

Write a function to generate all possible n pairs of balanced parentheses.

Examples:

Input: n=1

Output: {}

Explanation: This the only sequence of balanced parenthesis formed using 1 pair of balanced parentheses.

Input: n=2

Output: {}{} {{}}

Explanation: This the only two sequences of balanced parenthesis formed using 2 pair of balanced parentheses.