While folks are joining

Get you laptops ready and login to www.crio.do.
We will be coding away in the session!

DSA-1

Session 4

What’s for this session?

- Odd and Even numbers
- Recursion
- Fibonacci
- Prime, Co Prime and GCD
- Problems
    - Find the Nth Fibonacci Number
    - Find numbers coprime to a given number

Odd and Even numbers

- How to check if a number is odd or even?

Recursion

- What is recursion?
  - Recursion is a method where the solution to a problem **depends on solutions to smaller instances of the same problem**. A **method** (function) can **call itself** in order to solve the problem.
- Real world example
  - Searching for a word in a dictionary
- Base/Terminating condition
  - The case for which the solution can be stated non-recursively/directly/trivially.
- Recursive condition
  - The case for which the solution is expressed in terms of a smaller version of itself.
- Function signature
  - Return type
  - Input parameter
- Space and Time Complexity of Recursion

Let’s try out some Recursion problems

- Sum of numbers up to n (E.g. n = 5, Ans: 15)
  - Base/Terminating condition
  - Recursive condition
  - Function signature
  - Write the function
  - Space and Time complexity
- Print backward counting (E.g. n = 6, Ans: 6 5 4 3 2 1)
  - Base/Terminating condition
  - Recursive condition
  - Function signature
  - Write the function
  - Space and Time complexity

Fibonacci

- What is this?
  - It’s a series where sum of nth term is equal to sum of previous 2 terms.
  - F(n) = F(n-1) + F(n-2) for each n >= 2.
  - F(0) = F(1) = 1.

Series - 0, 1, 1, 2, 3, 5, 8, 13 . . .

How to Approach Problems?

For any given problem, following these milestones will help you solve the problem systematically:

- **Milestone 1** - Understand the problem statement and confirm your understanding with some examples or test cases, including edge cases.
- **Milestone 2** - Think about approaches and select the best one you know. Explain your approach to a 10 year old. Write the pseudocode with function breakdown.
- **Milestone 3** - Expand pseudocode to code
- **Milestone 4** - Demonstrate that the solution works

Activity 1 - Find the nth Fibonacci number

Primes, Co-Primes and GCD

- What is a prime number?
  - A number that can be divided exactly only by itself and 1. For example 7, 17 and 41.
- How to check if a number is prime?
  - Check only till n/2 or sqrt(n)?
- What is GCD of two numbers?
  - **Greatest common divisor** (**GCD**) of two numbers, which are not all zero, is the largest positive integer that divides each of the integers
- How to find the GCD of two numbers?
- What are co-prime numbers?
  - A co-prime number is a set of numbers or integers which have only 1 as their common factor i.e. gcd(a,b) = 1.
- How to check if two numbers are Co-Primes?

Activity 2 - Find numbers coprime to a given number

Questions?

Take home exercises

- Find the largest number
- Print odd numbers up to n
- Check if the given number is prime

To be solved before the next session on Thursday, 7:30 PM

Feedback

Thank you for joining in today. We'd love to hear your thoughts and feedback.

https://bit.ly/dsa-nps

Thank you