CSIT113
Problem Solving

Workshop - Week 8

Fake coin 1

- There are eight identical-looking coins; one of these coins is counterfeit is known to be lighter than the genuine coins.
- What is the minimum number of weighings needed to identify the fake coin with a two-pan balance scale without weights?

Fake coin 2

- You have $n > 1$ identical-looking coins: $n - 1$ of them are genuine with a known weight g, and one of them - of an unknown weight different from g - is counterfeit.
- Design an algorithm that determines the fake in the minimum number of weighings on a spring scale.
- Assume that then spring scale indicates the exact weight of the coins being weighed.

Fibonacci's Rabbits Problem

- A man put a pair of rabbits in a place surrounded on all sides by a wall.
- The initial pair of rabbits (male and female) are newborn.
- All rabbit pairs are not fertile during their first month of life but give birth to one new male/female pair at the end of the second month and every month thereafter.
- How many pairs of rabbits will be there in a year?

Searching a Sorted Table

- One hundred different numbers are written on 100 cards, one number per card.
- The cards are arranged in 10 rows and 10 columns, in increasing order in each row (left to right) and each column (top down).
- All the cards are turned faced down so that you cannot see the numbers written on them.
- Can you devise an algorithm to determine whether a given number is written on one of the cards by turning up less than 20 cards?