

Date: / /

Assignment: 1

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B-41

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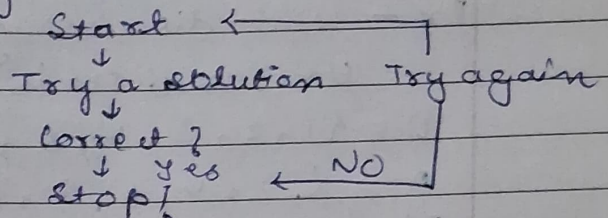
1. Techniques

Trial and error

Keep trying possible solutions until correct one is found

Example: - Guessing a password

Flowchart:



Algorithmic Method

Step-by-step procedure to solve a problem

Example - Long division method in mathematics

Heuristic Method

Uses rules of thumb or shortcuts when exact solution is hard.

Example - Searching words in a dictionary.

Divide and Conquer

Breaking large problem into smaller sub-problems

Example: Binary Search Algorithm.

Working Backwards

Start from the goal and trace back to the given condition

Example: Solving a maze by starting from the exit.

2) Power set $P(A)$ = set of all subsets of A .

Given $A = \{1, 2, 3, \dots, 15\}$

Subsets:

16 elements (because $\rightarrow 2^n \rightarrow 2^4 = 16$)

3) Universal set (U) is the set that contains all objects or elements under consideration for a particular discussion or problem.

Ex - when discussing no. from 1 to 10 the Universal set is $U = \{1, 2, 3, \dots, 10\}$

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{2, 4, 6, 8, 10\}$

$A' = U - A = \{1, 3, 5, 7, 9\}$.

4) Invariants

Box Problem

Each time, non-empty boxes increase in multiple of 8

Invariant: Total empty boxes remain 100

So total boxes = Empty + Nonempty $= 100 + 1100$
 $= 740$ boxes

~~Ant~~ chocolate Problem

every cut increases no. of pieces by 1.

initial pieces = 1, final pieces = $6 \times 8 = 48$.

Number of moves = $48 - 1 = 47$

Since 47 is odd, first player wins

5) Definition - Non-deterministic choice refers to a scenario in problem solving where an algorithm or a process has multiple possible actions to choose from at a point and it does not specify which one to take. It's like "magically" choosing the correct path if one exists.

Meaning :- It is a theoretical concept used to simplify the description of algorithms and explore the possibility of a solution without defining the exact steps to find it.

(a) Model the ~~tumbler~~ problem using non-deterministic choice.

We can model the state of each tumbler as a binary value: 1 for upside up and 0 for upside down.

(b) Finding suitable invariants for the problem
The key is to notice what changes and what stays the same when you flip the 2 no.

1. Both were up 2. Both were down
3. One up, one down.