Special Assignment

1. Multipeg Tower of Hanoi

4 pegs given so state space is

$\langle n, 0, 0, 0 \rangle \rightarrow$ Initial (Size of state space is $4n$)

$\langle 0, 0, 0, n \rangle \rightarrow$ final $\rightarrow$ {states can have n disk at any peg}.

$\rightarrow$ backtracking will prune state space.

$n = 64$ constraints lower disc placed over Higher disk.

Only one disk moved at a time.

k out of N disks selected.

$(n-k)$ moved from peg 1 to peg 3 (smallest disks) recursively

k large disks moved from peg 1 to peg 2

$(n-k)$ disks moved recursively from peg3 to peg 2 using all.

$$T(n) = 2T(n-k) + 2^k - 1$$
$$T(1) = 1$$

$k = \sqrt{2n}$

Approximation of number of moves as f^n of disks

$$M(n) = \text{Sqrt}(n) \times 2^k$$
$$= \sqrt{n} \times 2^{\sqrt{2n}}$$

So for 64 it is approximately $M(64) \sim 8 \times 2^{\sqrt{128}}$

$\sim 8 \times 2^{8\sqrt{2}}$

$\sim 8 \times 2^{8 \times 1.4}$

$\sim 8 \times 2^{11.2}$

~ 18820 moves

If 3 pegs used then

{ $(2^n - 1)$

$(2^{64} - 1)$ many moves }

The state space will involve pruning & backtracking from nodes at child level to its ancestor to explore next best possible move leading to goal state given the above two constraints.

2. Bridge involves dummy + player 1
dummy + player 2

Winning strategy of players can involve player 1 having suit with highest rank in his hand.

But this might not work in all situations

The player which has the longer hand can also win in trump hand.

The optimal strategy for a player would be to exhaust the rank suit of other player's hand and have a longer non tru hand.

3.

Each solvable problem has a program so it's count is the numbe programs thus it is countably infinite. (set of integers)

For unsolvable problems consider set of programs print [i,j] i,j each program in this set is unsolvable as no algorithm which list all values in [0, 1] and this is true for all [i, j] Since size of this set is R, the number of unsolvable problems is uncount (Set of Real numbers)