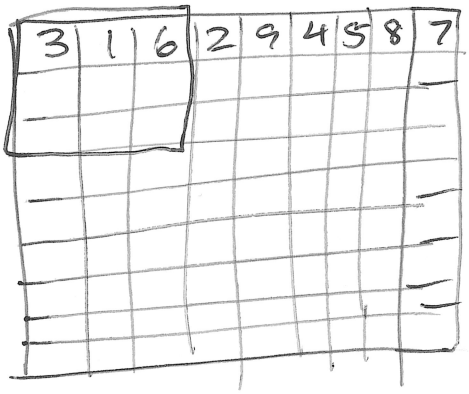
COP3503 1/18/24

Sudoku



1-9 perm
1-9

Input: some squares filled in such that there's only 1 unique way to correctly fill in rest

↘ 7 * 8 2 9

4 9

6 5

5

4

9

```
go(int[] board, int k)
  if (filled(k))
    return go(board, k+1)
  if (k == board.length)
    return true;
  // i = poss num
  for(int i=0; i<10; i++) {
    if (samebox(k, i))
      continue;
    if (samerow(k, i))
      continue
    if (samecol(k, i))
      continue;
    board[k] = i
    boolean tmp = go(board,
                     k+1);
    if (tmp) return true;
  }
  return false;
}
```

0 1 2 3 4 5 6 7 8

9 10 11 12 13 14 15 16 17

⇒ 18 19 20 21 22 23 24 25 26

18+i, 0-9 → 18, 19, 20, .. 26

24%9 == 6

Skip spot

k = 24

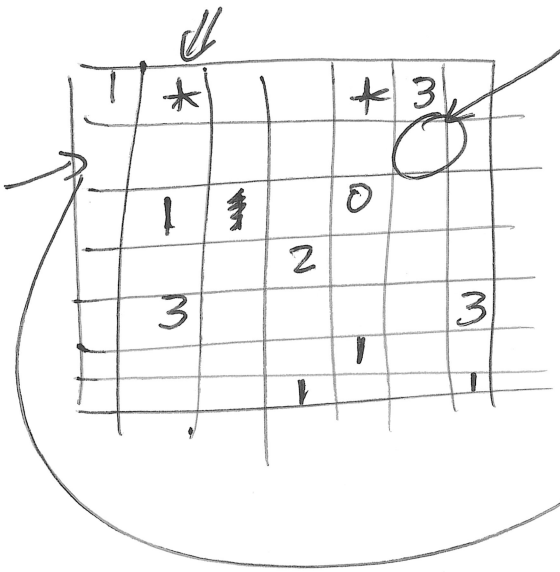
24%9 = 6

k/9 = 2

↳ row 2

(k/9)*2 = 18

Tentai2U



can I make this blank?

? Is it a viable option to draw a bomb?

(1) Skip drawing a bomb is any adjacent sq has a number AND this n. bomb would make it too big

(2) If not drawing bomb will prevent me from reaching my #, then skip this option.

(3) If you've already placed all of your bombs...

(4) If we have to place bombs in every future slot to get to our total...

Divisors

for all $x \leq n$, which value of x has the most divisors? If there are multiple values of x answer with the smallest one.

$n \leq 10^{16}$

Slow

```
int maxd = 0;
for (i = 1; i <= n; i++) {
    int numd = 0;
    for (j = 1; j <= n; j++)
        if (i % j == 0)
            numd++;

    // save if
    if (numd > maxd) {
        maxd = numd;
        res = i;
    }
}
```

$O(n^2)$

10^{32} ↓ very very SLOW

for 4, I just need to calculate smallest # that has 4 divisors

1 → 1
2 → 2
3 → 4
4 → 6
~~5 → 16~~
6 → 12

$n = 3^3 \times 5^2$

$(3+1)(2+1)$

$= 12$ divisors

$3^a \times 5^b$ → $[0,3]$ $[0,2]$

$n = 2^3 \times 3^2$ also 12 divisors smaller

Key Idea - if we want gen a num might be smallest w/ some fixed # divisors it must be of the form

$$2^a 3^b 5^c 7^d \ldots$$

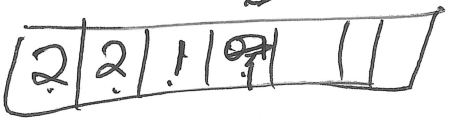
$$a \geq b \geq c \geq d \ldots$$

2^1

$2^1 3^1$

$2^1 3^1 5^1 \ldots$ too big stop

$2^2 3^2$



$2^2 \times 3^2 \times 5 \times 7$ } num

$3 \times 3 \times 2 \times 2 = \cancel{48}\ 36$ divisor

10^{16} I stop

Cut out