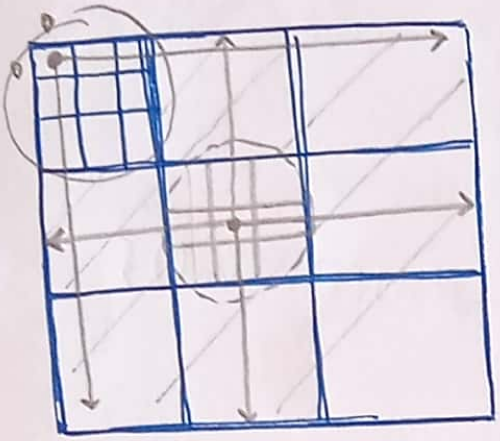
(6) Sudoku (Backtracking)



for a no. to be placed correctly in a cell of subgrid (ex (0,0)) it must:

(1) not be in any of the cell of its row.

(2) " " " " "

of its colum.

(3) not be in any cell of its subgrid.

a no. that is not repeated along the row, col. or subgrid.

Algo ..

(1) Try to place a "safe" number.

(2) Make a recursive call on the subproblem. (It can return T/F).

(i) If true:
return true again

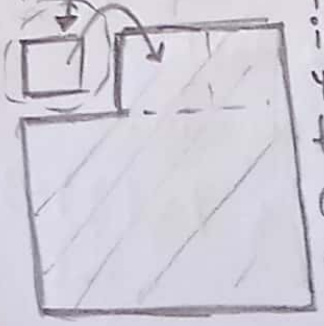
(ii) if false:
try to update the curnt no.

bydefalt all cells are filled with 0

How will the app look

		9						
				5	7	6	8	9
5			4	6	9	1		3
	1		5	4				8
4						2	3	6
			7	8	3	5		4
6							4	5
	8	5	1		4			2
	4		6		5		7	

Get New Puzl



one can place from 1-9 in a cell. Supose you filled a no. in this cell. thn it'll call for nxt cell as shown.

(1) → ab nxt cell bhi safe no. dhundega. & will fill it.

Supose koi safe no. hai hee nhi fill krne ko to this cell will return false to prev cell. take prev cell could update to a no. jise age ke cells me safe no. mil jaye else vo true return kr dega.

Solve

Logic (Boiler templ. for html, css & few fn in js)

to chek if val/no. is safe:-

```
funct isSafe(baard, sr, sc, val){
    for (var i=0; i<9; i++){
        if (board[i][sc] == val || bard[sr][i] == val){
            return false;
        }
    }
```

to check is no. is not repeated along row or col.

to get strt coordinates of subgrid of the no.

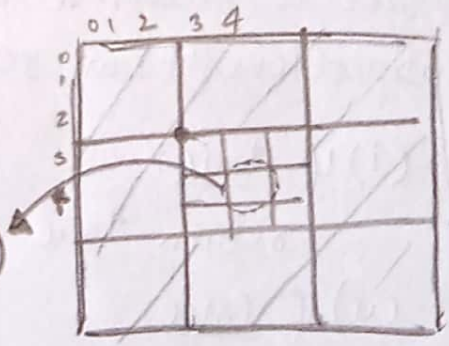
```
var x = sr - sr%3;
var y = sc - sc%3;
```

} this is similary to $x = \left(\frac{sr}{3}\right) * 3$, $y = \left(\frac{sc}{3}\right) * 3$

```
for (var i = x; i< x+3; i++){
    for (var j=y; j<y+3; j++){
        if (bard[i][j] == val){
            return false;
        }
    }
}
return ~~false~~ true;
}
```

Subgrid me no. repeat to nhi hua:

to chek that



How to check in subgrid?

If we get co-ordinates of the start^n cell of this subgrid then we can easily find the boonds too!

By few trial & error we can derive the formula:-

$x = \left(\frac{x}{3}\right) * 3$ & $y = \left(\frac{y}{3}\right) * 3$ (2) → (ex) $x = \left(\frac{4}{3}\right) * 3 = 1 * 3 = 3$ & $y = \left(\frac{4}{3}\right) * 3 = 1 * 3 = 3$

```
solveSudoku(board, sr, sc){
  if (sr == 9){
    changeBoard(board);
    return;
  }
  if (sc == 9){
    solveSudoku(board, sr+1, 0);
    return;
  }
  if (board[sr][sc] != 0){
    solveSudoku(board, sr, sc+1);
    return;
  }
  for (var i=1; i<=9; i++){
    if (isSafe(board, sr, sc, i)){
      board[sr][sc] = i;
      solveSudoku(board, sr, sc+1);
      board[sr][cc] = 0
    }
  }
}
```

agr for yaha pohoch jaye then renew the board.

agr for yaha pohoch jaye then change the row

If the cell isn't empty or 0 then move to next cell.

1-9 no. can be filled

check if safe

Backtrack