Problem 1 : sum

Program received N as input, Return summation value of index 1 to N

index	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
value	1	2	6	4	15	12	7	8	18	30	11	24	13	14	150	16	17	36

N = 5 , output = 1+2+6+4+15 = 28
N = 15, output = 1+2+6+4+15+12+7+8+18+30+11+24+13+14+150 = 315

Example Input	Example
5	28
15	315

Problem 2 : coin

Given two type of coin, which have value A bath and B bath. Determine whether the target value T can be summed by the given types of coin.

6,8,10 -> A=6, B=8, target value=10; Coins 6 and 8 cannot sum up to 10

2,3,10 -> A=2, B=3, target value=10; Coins 2 and 3 can sum up to 10

If there are many possible answers, print any of them

Example Input	Example
6, 8, 10	IMPOSSIBLE
2, 3, 10	na: 2, nb: 2

Problem 2 : coin

find such a case that T = a*na + b*nb

Propose algorithm

loop find na
    if b | T - (a * na) then
        nb = (T - (a*na))/ b

Problem 3: anagram

A word is an **anagram** of another if the second is simply a rearrangement of the first.

Example Input	Example
APPLE	['APPEL', 'APPLE', 'PEPLA']
PIE	['EPI', 'IPE', 'PEI', 'PIE']
noon	['NONO’, 'NOON']

Problem 3: anagram

Propose algorithm

1. We gonna count number of alphabet as shown below,
   get_key(PIE) -> 0_0_0_0_1_0_0_0_1_0_0_0_0_0_0_1_0_0_0_0_0_0_0_0_0_0

0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

2.Then, we will store “PIE” into the dictionary, using our precompute key

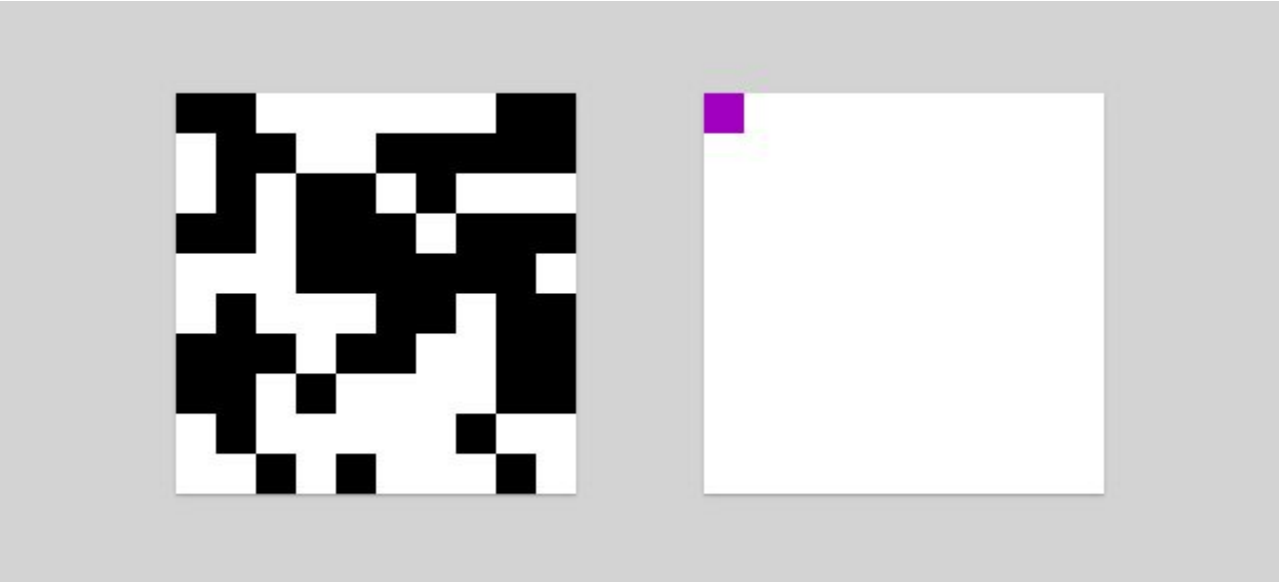
dict[get_key(PIE)].append(“PIE”)

3.In the end, dictionary should contains all words with the same alphabet count

dict[get_key(PIE)] = ['EPI', 'IPE', 'PEI', 'PIE']

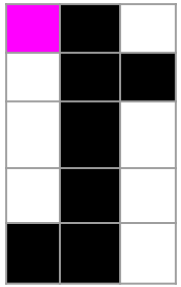
Problem 4: connected component

Visualized coloring algorithm



Connected Component -- Step 1

1



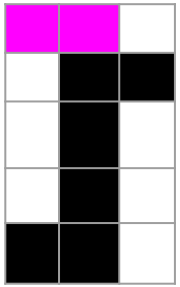
top

bottom

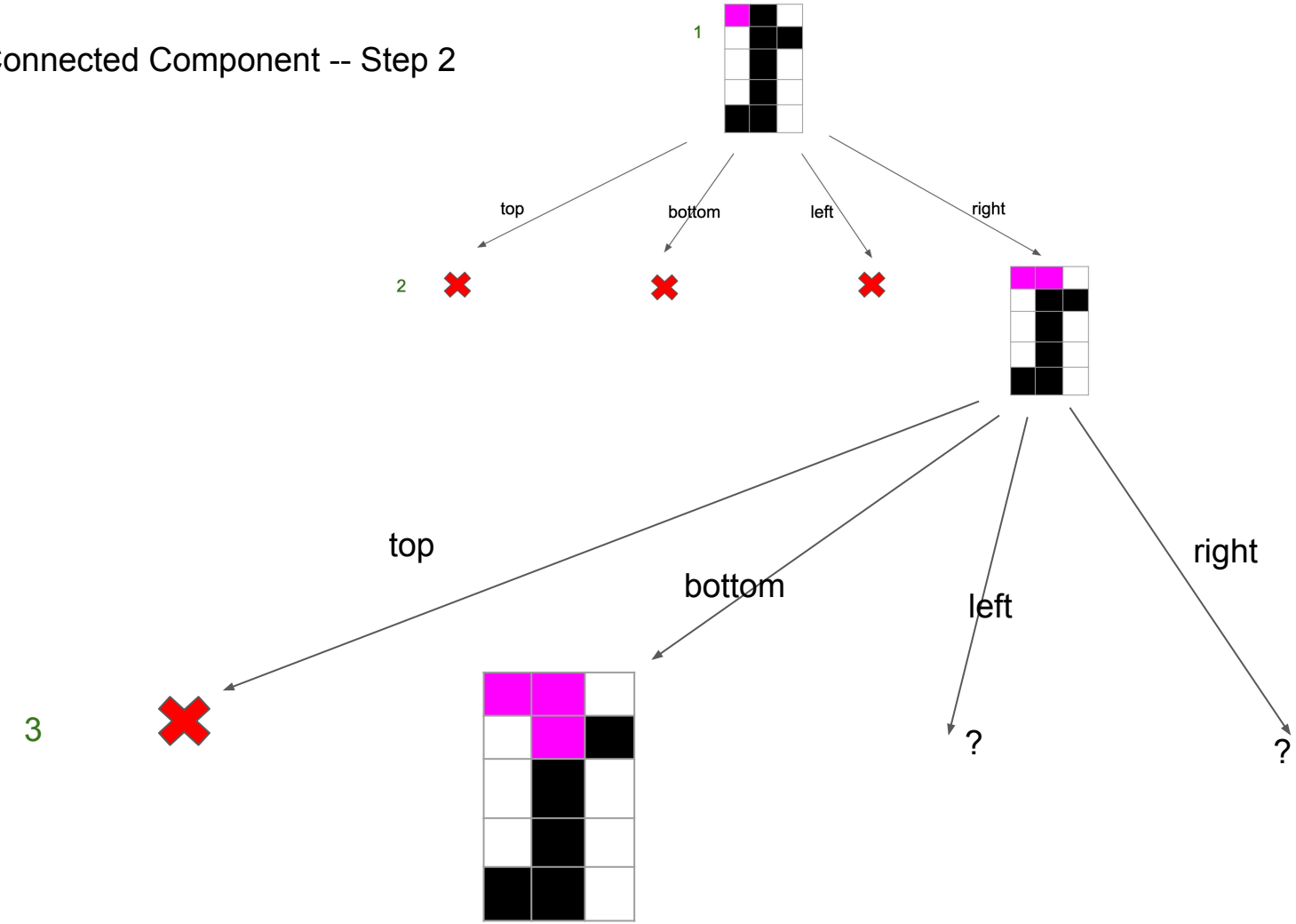
left

right

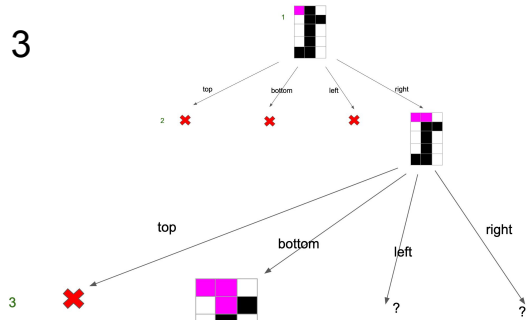
2



Connected Component -- Step 2



Connected Component -- Step 3



top

bottom

left

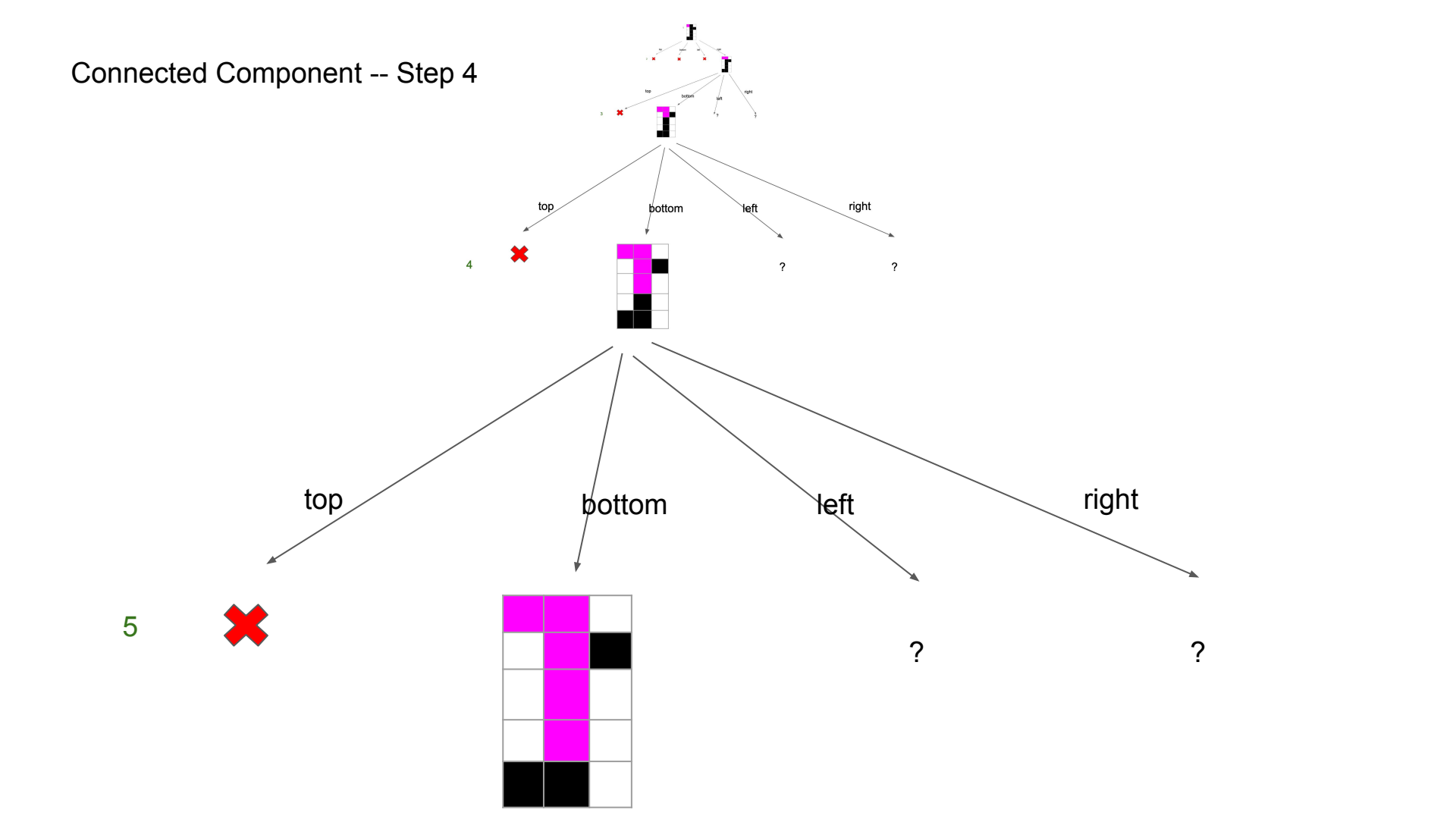
right

4

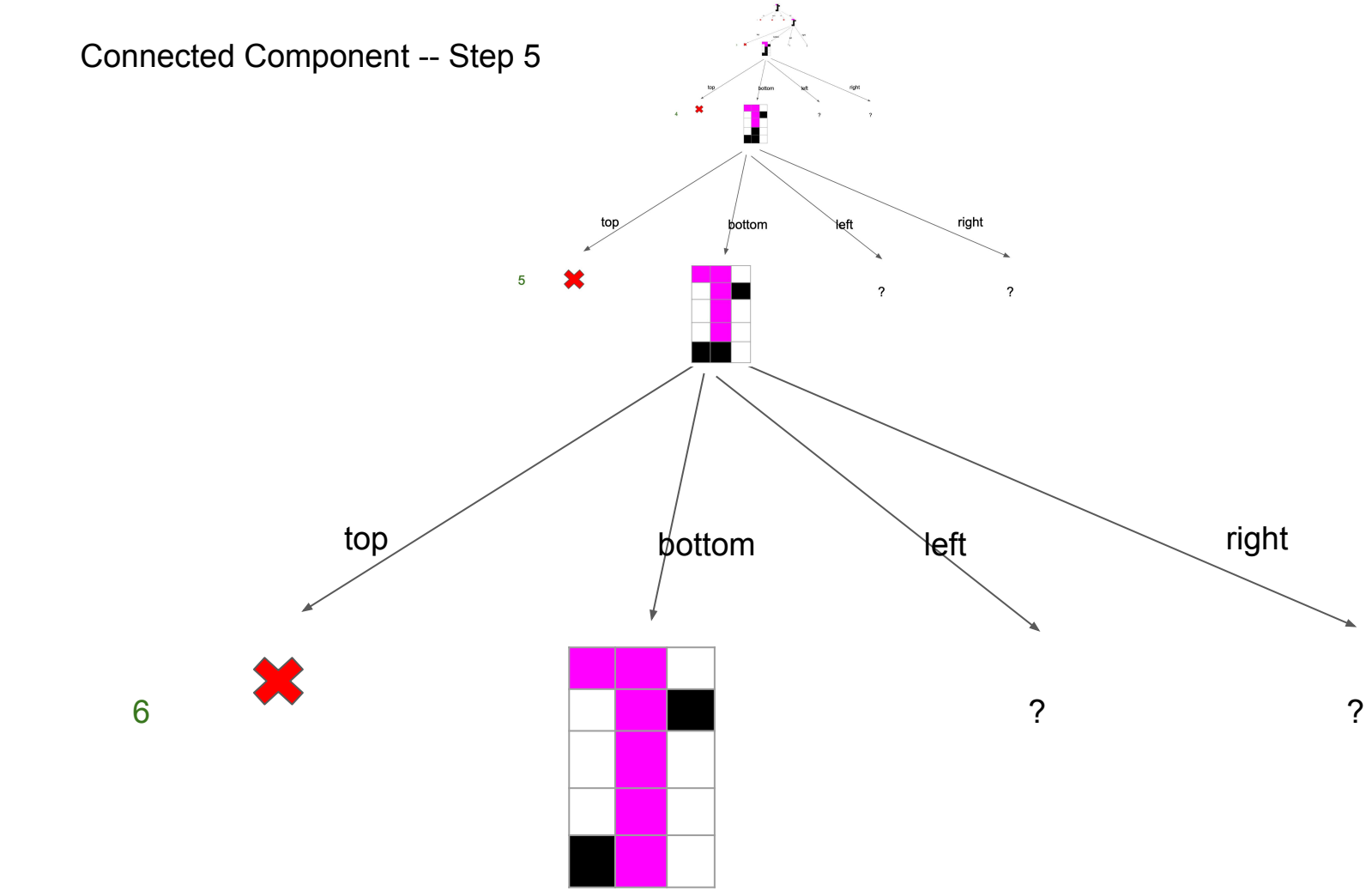
?

?

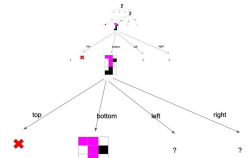
Connected Component -- Step 4



Connected Component -- Step 5

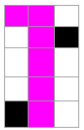


Connected Component -- Step 6



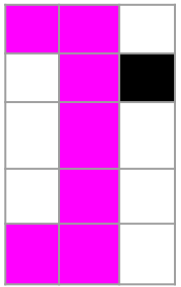
top bottom left right

6 ? ?

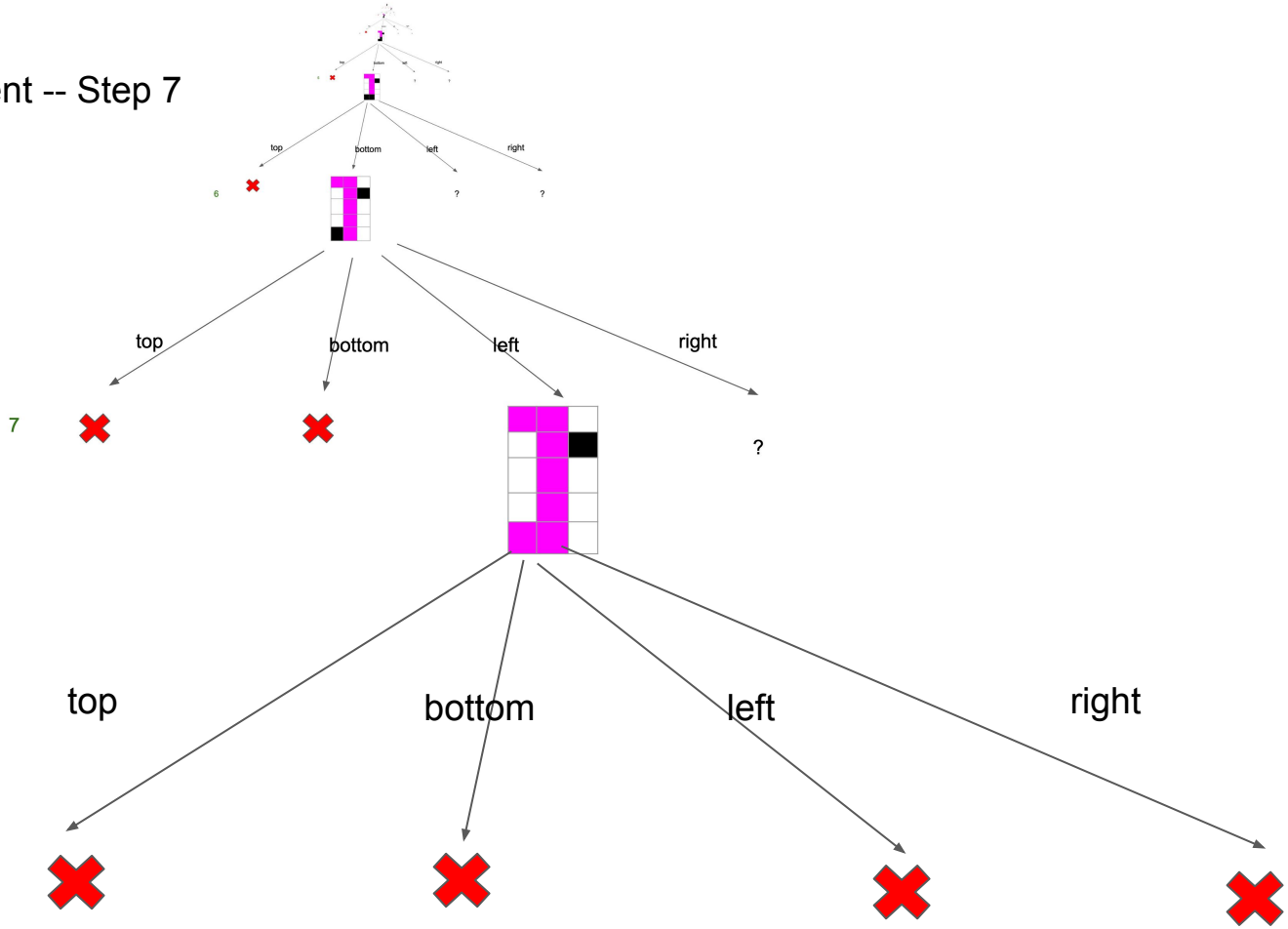


top bottom left right

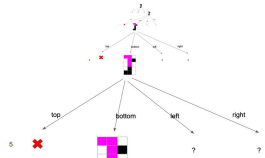
7 ?



Connected Component -- Step 7

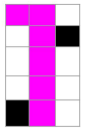


Connected Component -- Step 8



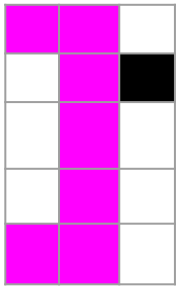
top bottom left right

6 ? ?

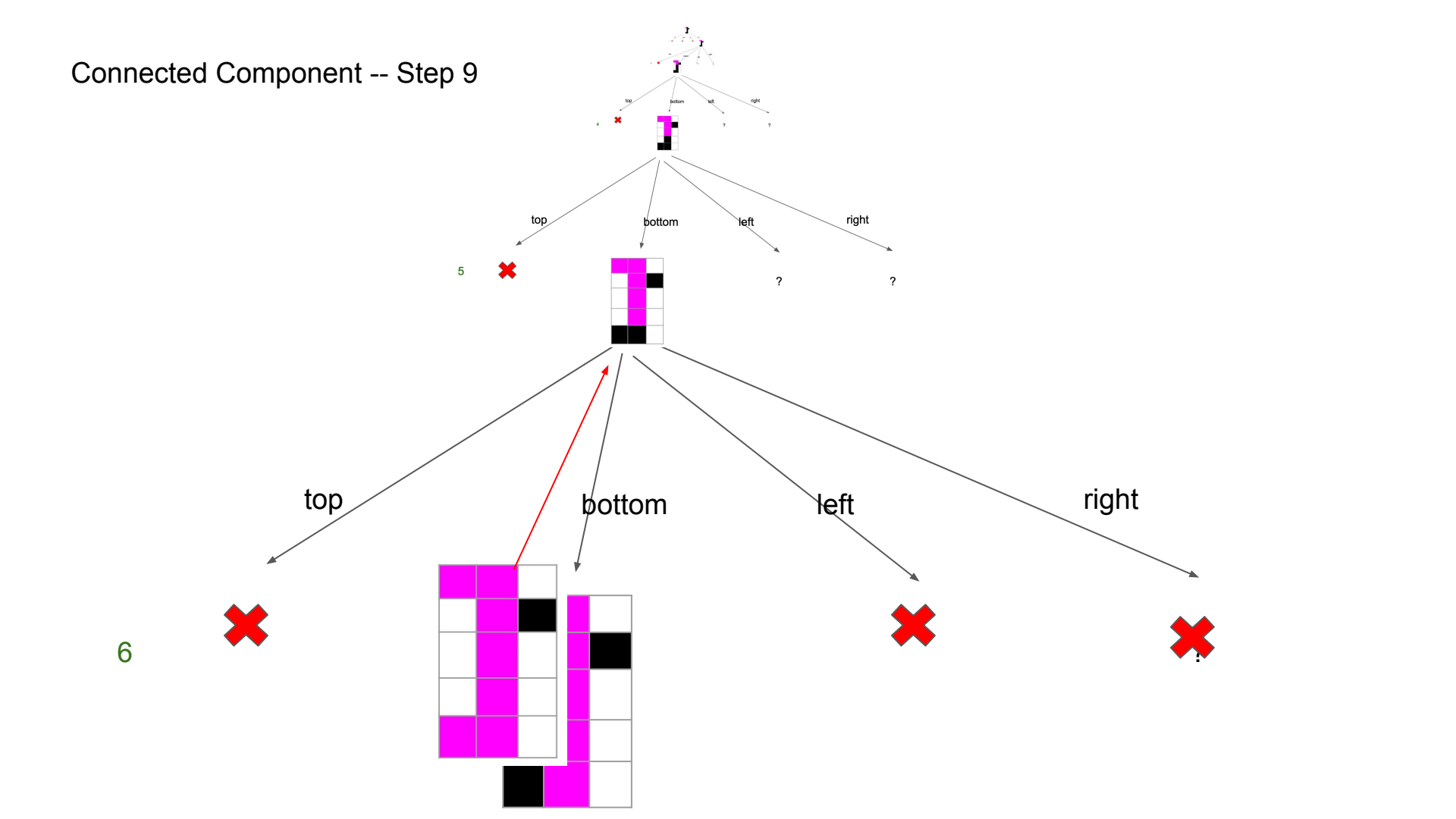


top bottom left right

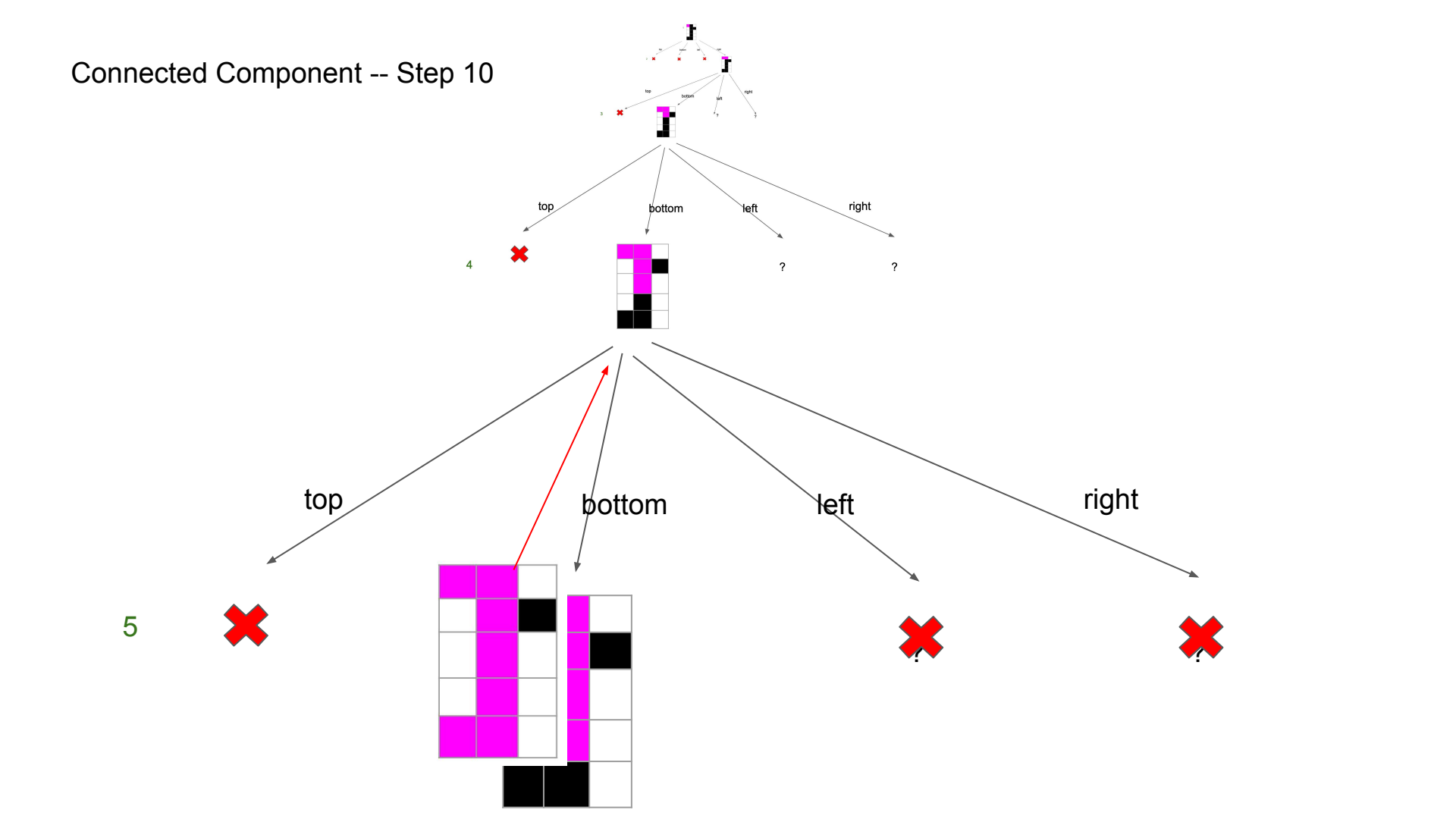
7



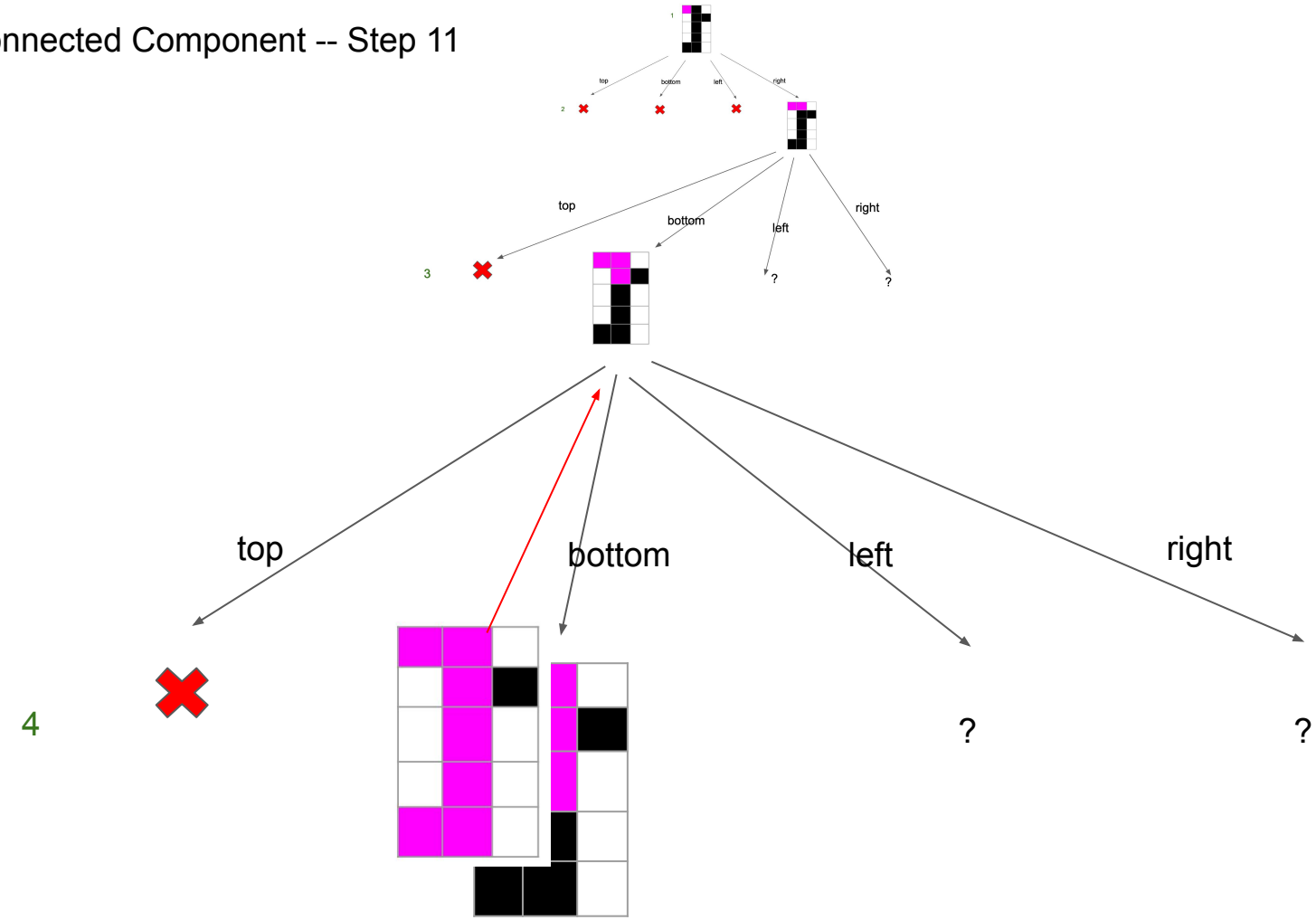
Connected Component -- Step 9



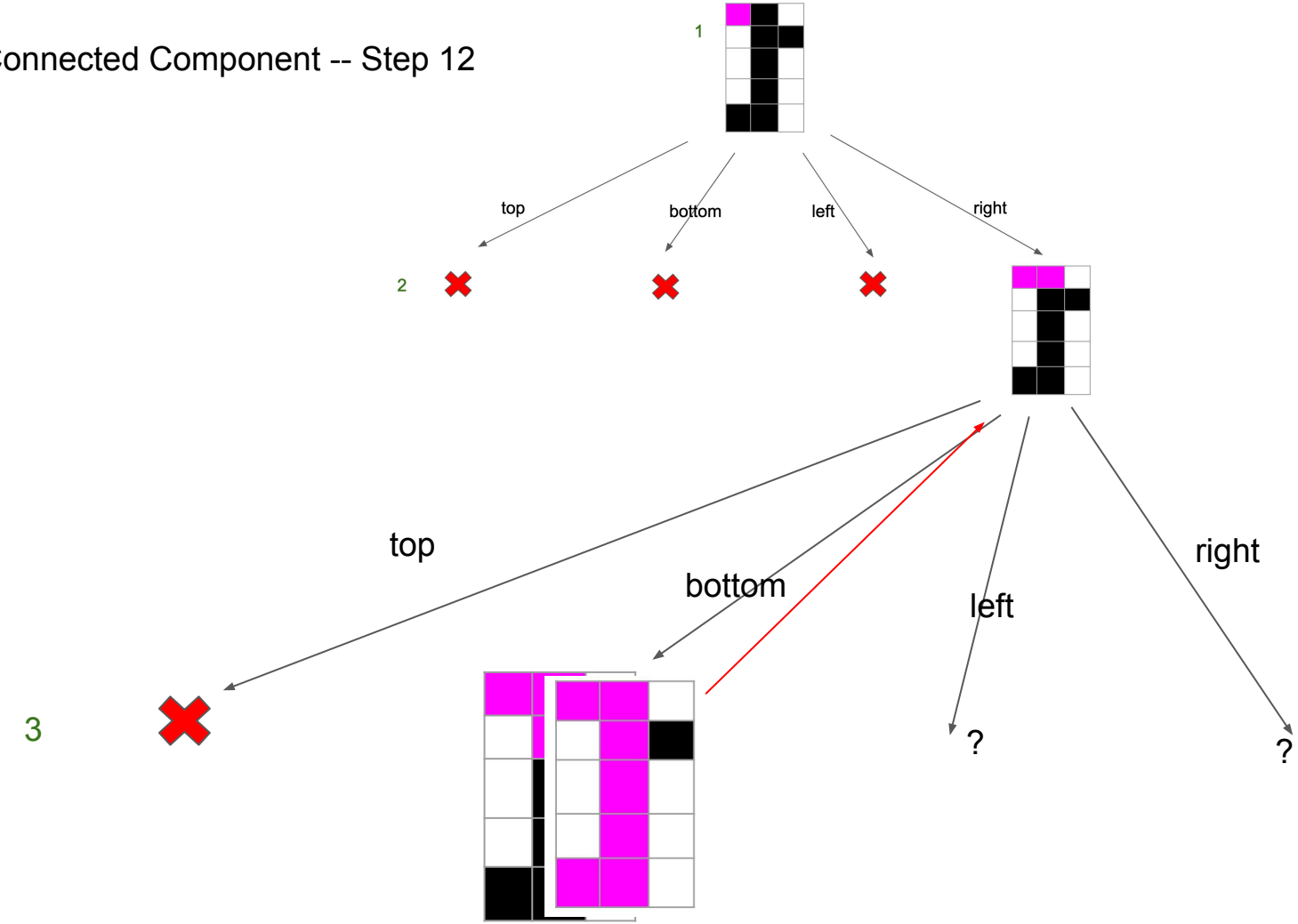
Connected Component -- Step 10



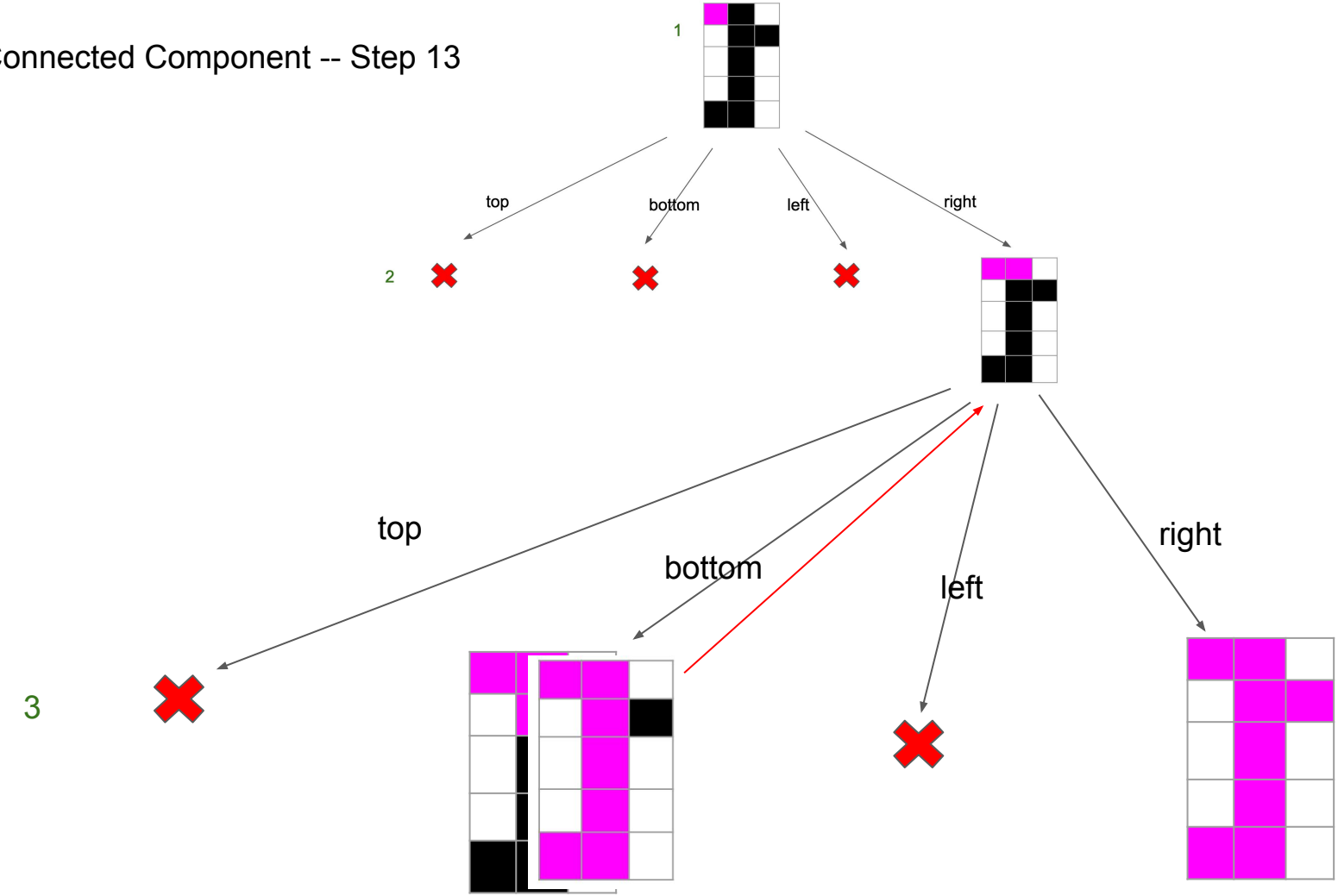
Connected Component -- Step 11



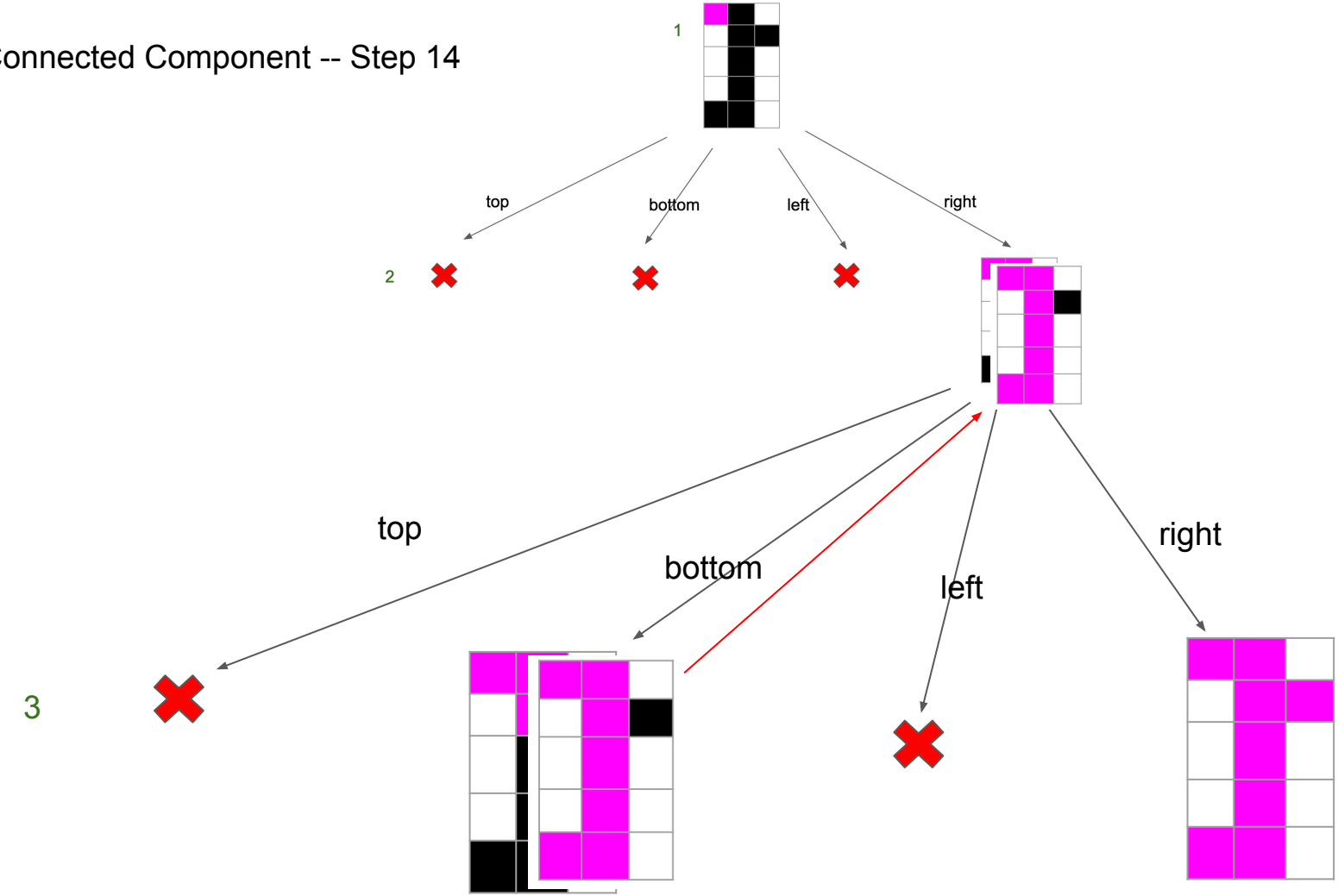
Connected Component -- Step 12



Connected Component -- Step 13



Connected Component -- Step 14



Connected Component -- Step 15