

Local Search

(a) States $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$ states.

(b) Max are 4 successor states (4 adj col swaps are possible).

Initial state

	1	2	3	4	5
1			a		
2	a				
3		a			
4				a	
5					a

① swap (1,2)

	1	2	3	4	5
1			a		
2		a			
3	a				
4				a	
5					a

② swap (2,3)

	1	2	3	4	5
1		a			
2	a				
3			a		
4				a	
5					a

③ swap (3,4)

	1	2	3	4	5
1				a	
2	a				
3		a			
4			a		
5					a

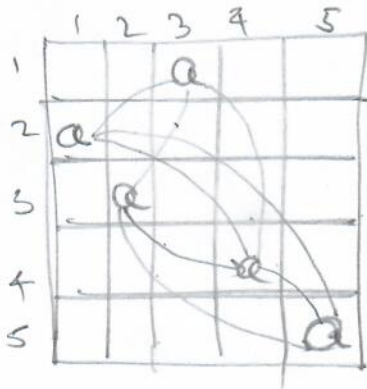
④ swap (4,5)

	1	2	3	4	5
1			a		
2	a				
3		a			
4					a
5				a	

- (c) Performing steepest ascent \Rightarrow
- Look at each successor
 - Go to the successor with the highest evaluation value. (greater than the initial state).

- $h(\text{Initial state}) = \# \text{ of non-attacking pairs of queens in the state.}$

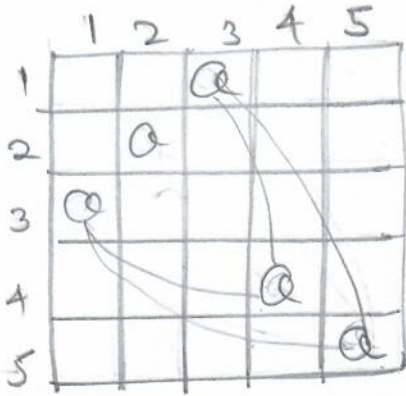
Note - Because of unique rows / cols for placing the queens attacks can only be along the diagonals



Arrows indicate non-attacks

$$h = 8$$

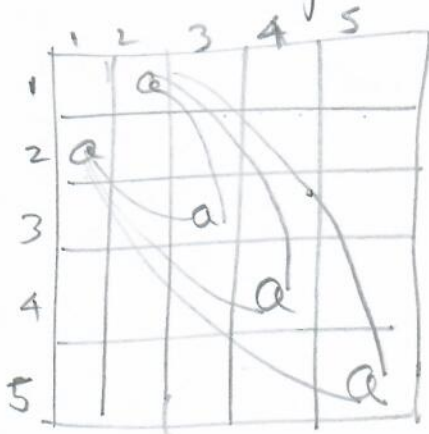
- h' : state after swap (1,2)



$$h = 4$$

Arrows indicate non-attacks

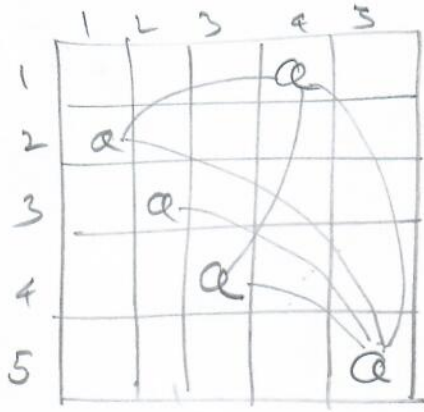
- h' : state after swap (2,3)



$$h = 6$$

Arrows: non-attacks

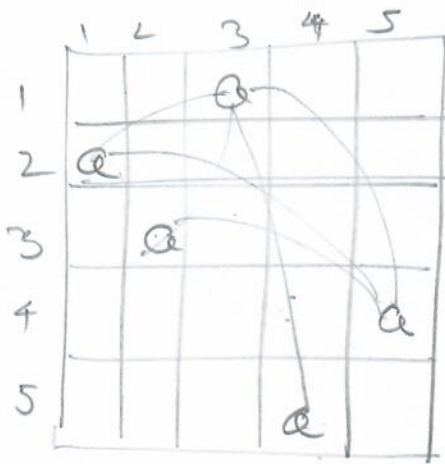
• h: state after swap (3,4)



$h=6$

A-6: non-attain

• h: State after swap (4,5)

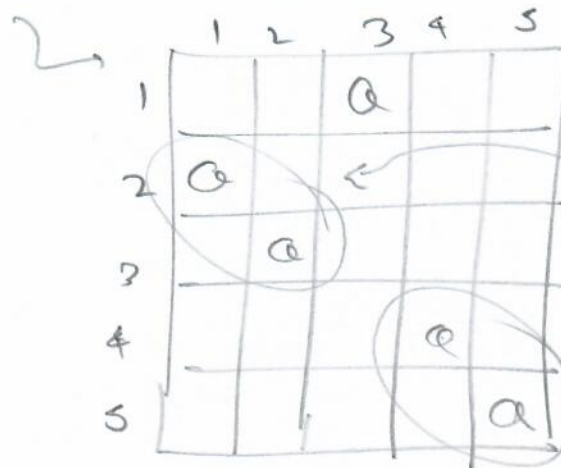


$h=6$

Procs: non-attain.

Since all successor values are smaller than the evalⁿ of the initial state, the search will remain in the initial state.

Local minima (not a solution)



circles indicate
attains in the
original
state.
Not a
solution.