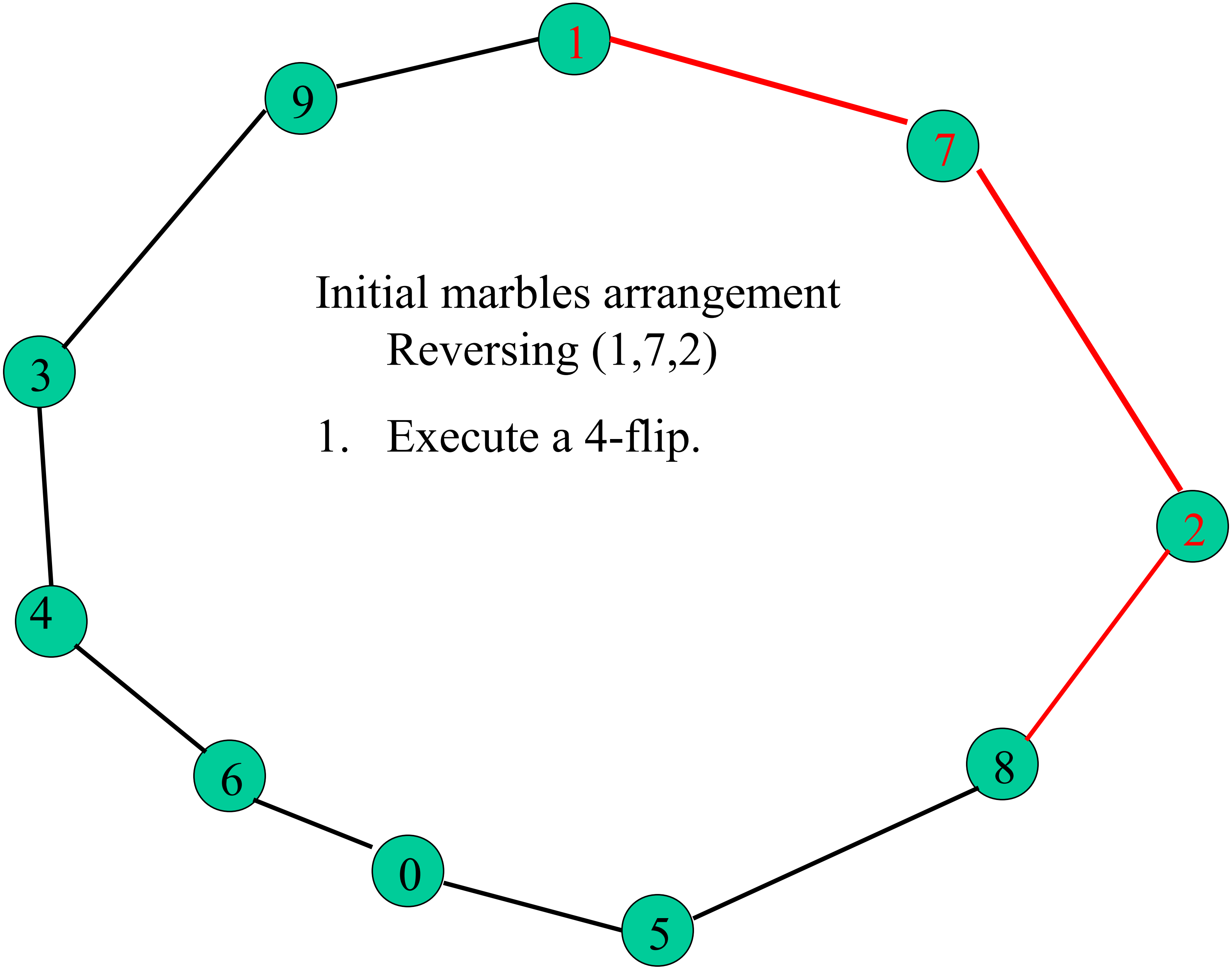
Claim: we can reverse 3 consecutive marbles.

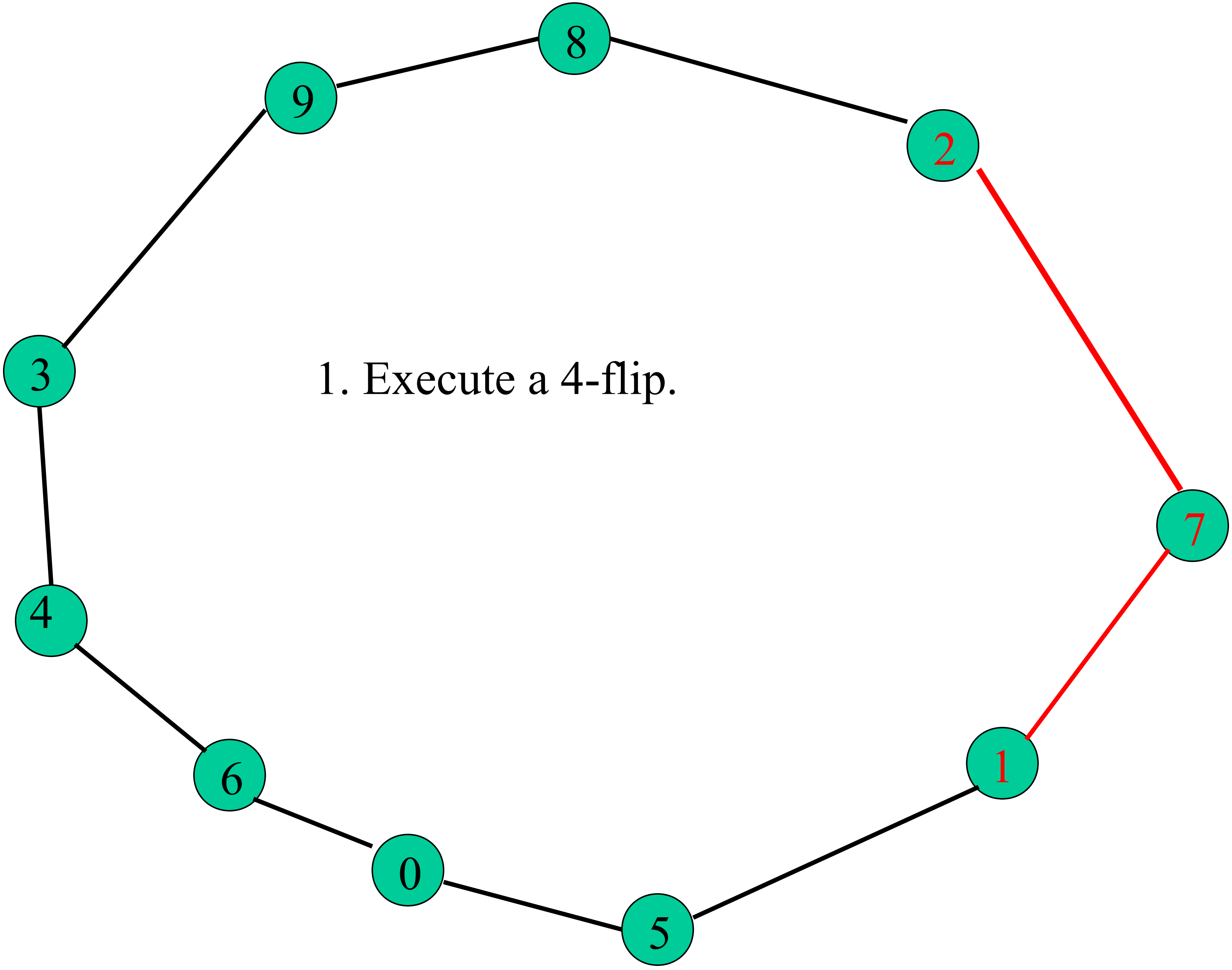
1. Reversing 3 consecutive marbles (wxy):
2. …w x y z a b c d… → **…**z y x w a b c d… →
3. …z a w x y b c d… → **…**z a b y x w c d …→
4. …z a b c w x y d… → **…**z a b c d y x w…
5. After an odd number of 4-flips the triple wxy is reversed to yxw.
6. If we continue with pairs of 4-flips …yxwkm → **…kwxym** → **…kmyxw** →**…** ==>
7. Since we have an even number of marbles, we shall reach: …y x w z a b c d…

Initial marbles arrangement

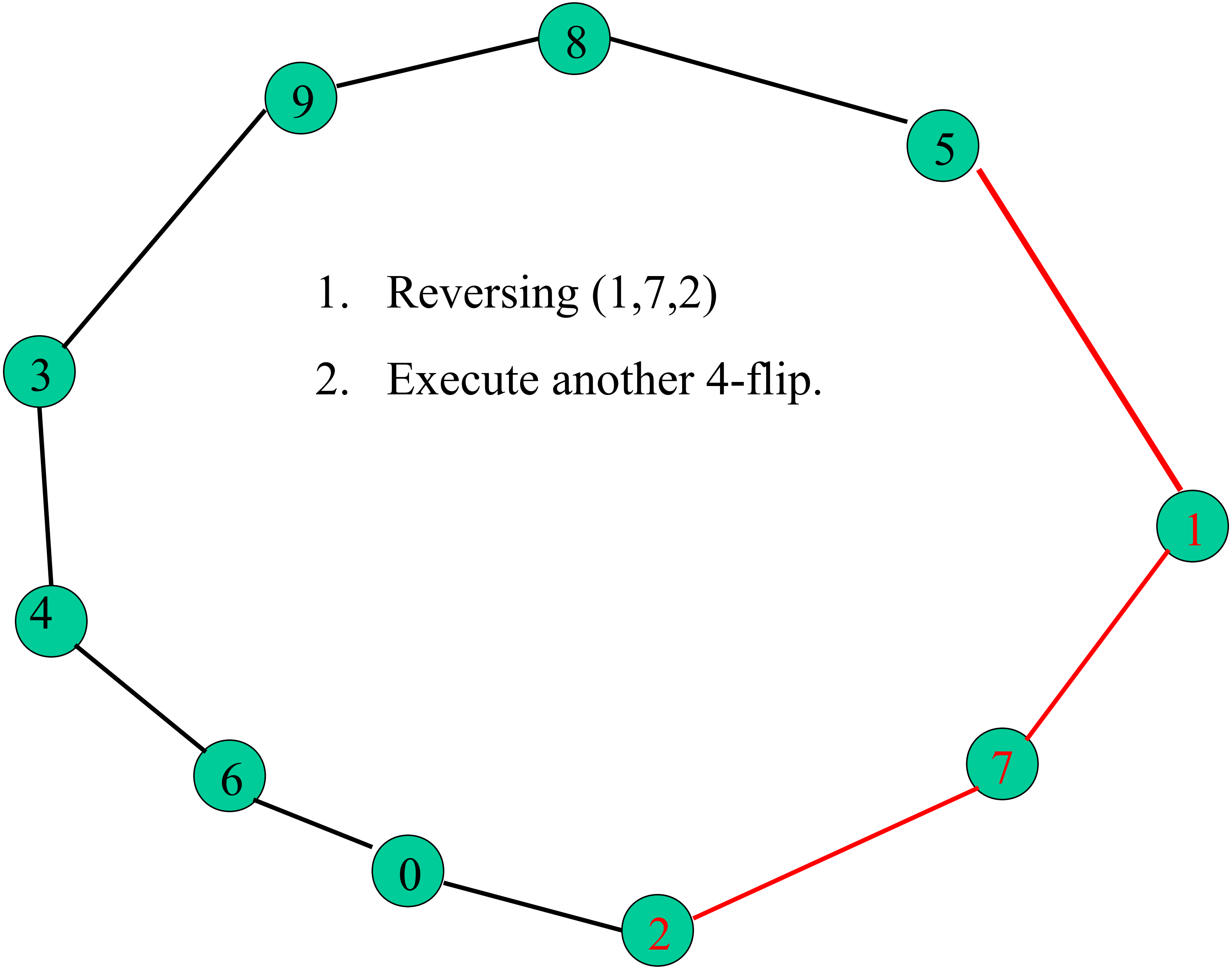
Reversing (1,7,2)

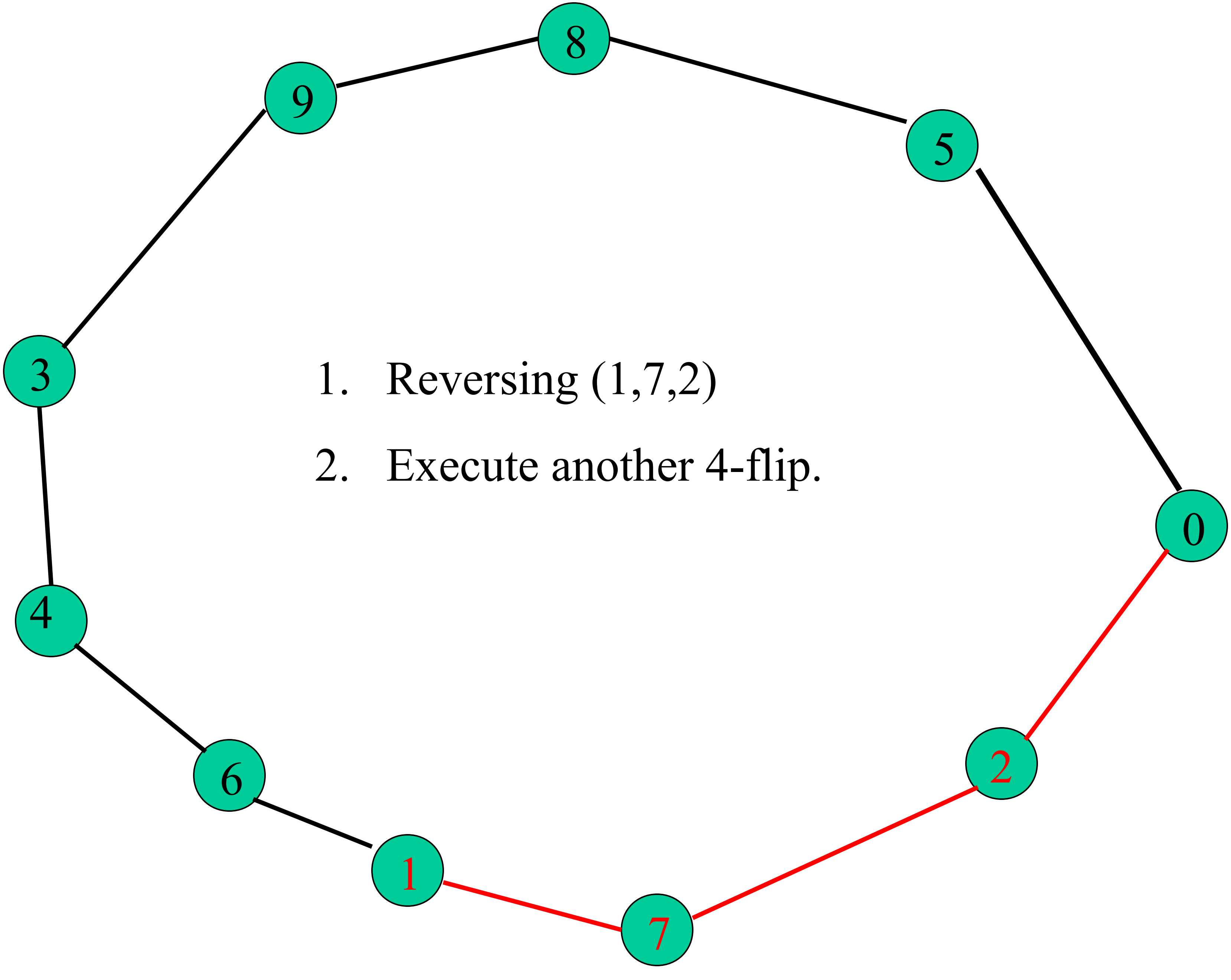
1. Execute a 4-flip.



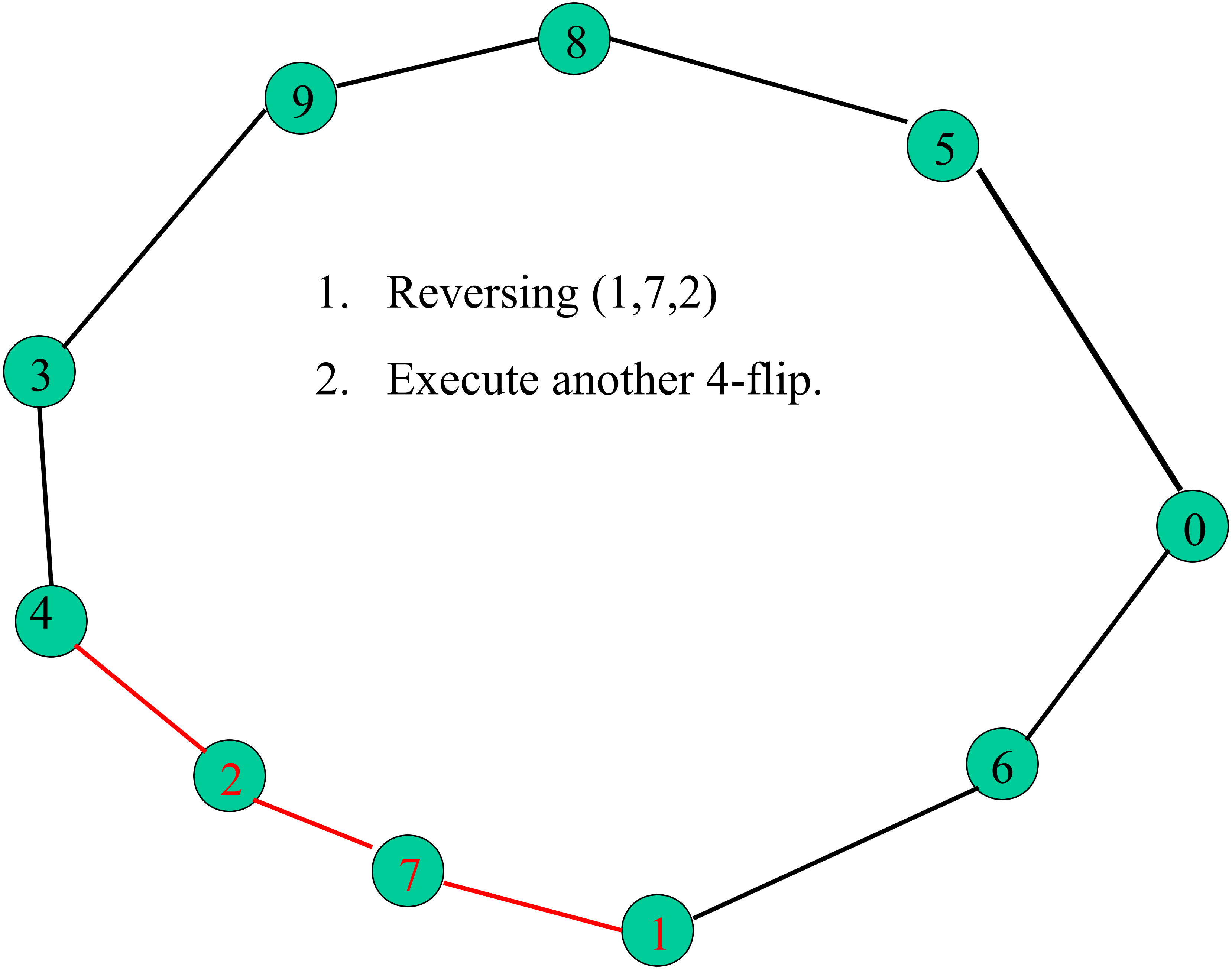

8
9
2
3
1. Execute a 4-flip.
7
4
1
6
0
5

1. Reversing (1,7,2)
2. Execute another 4-flip.

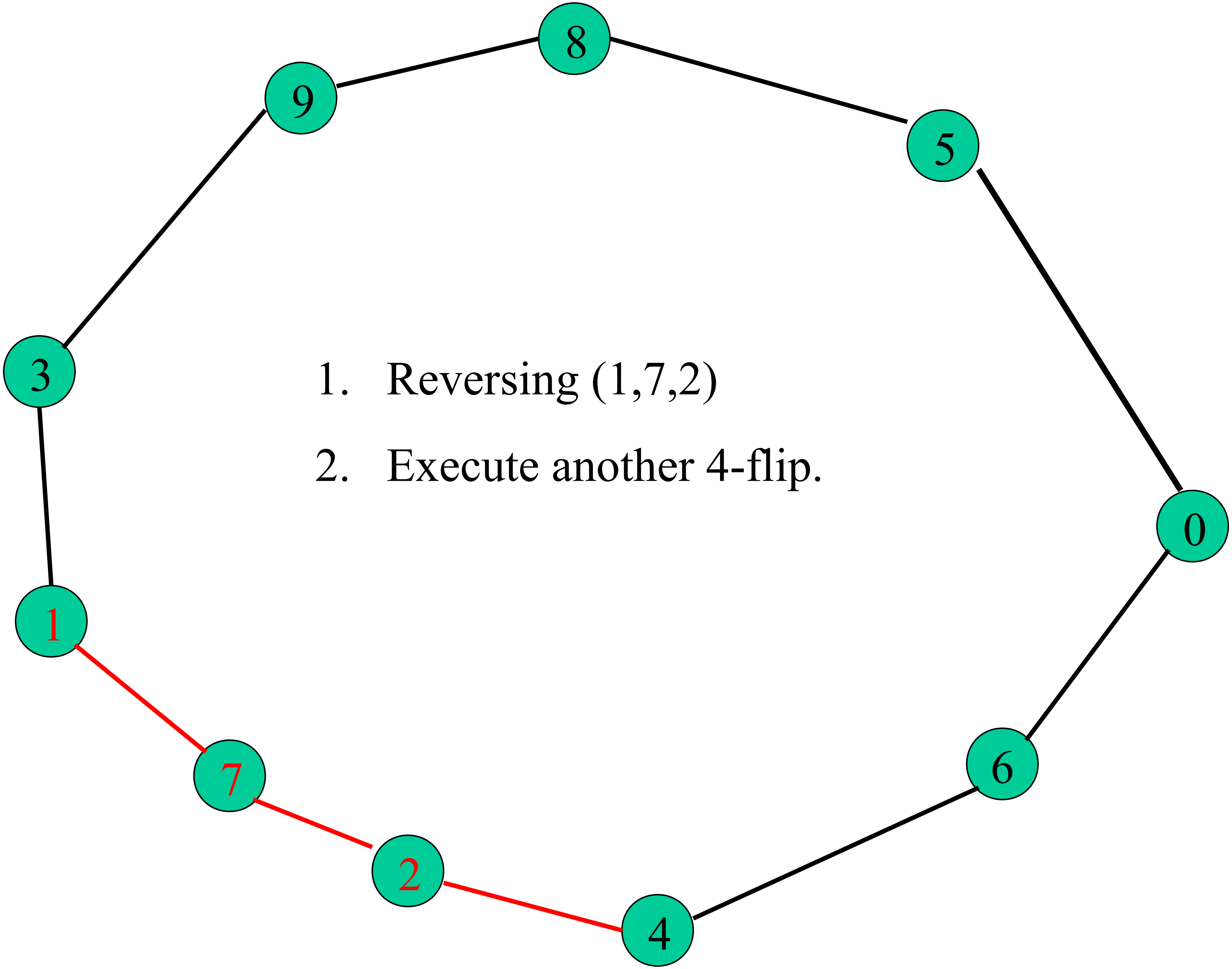




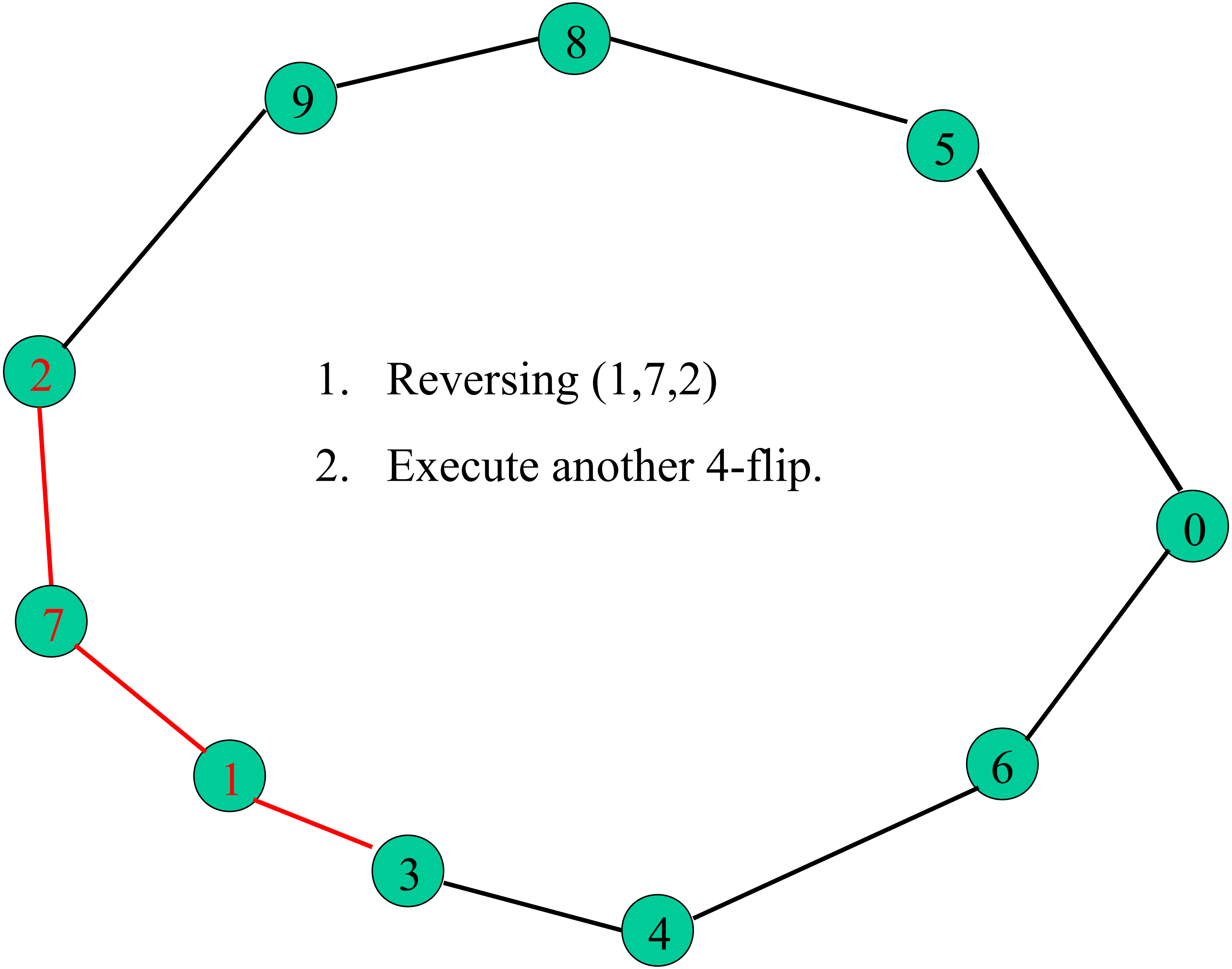
1. Reversing (1,7,2)
2. Execute another 4-flip.



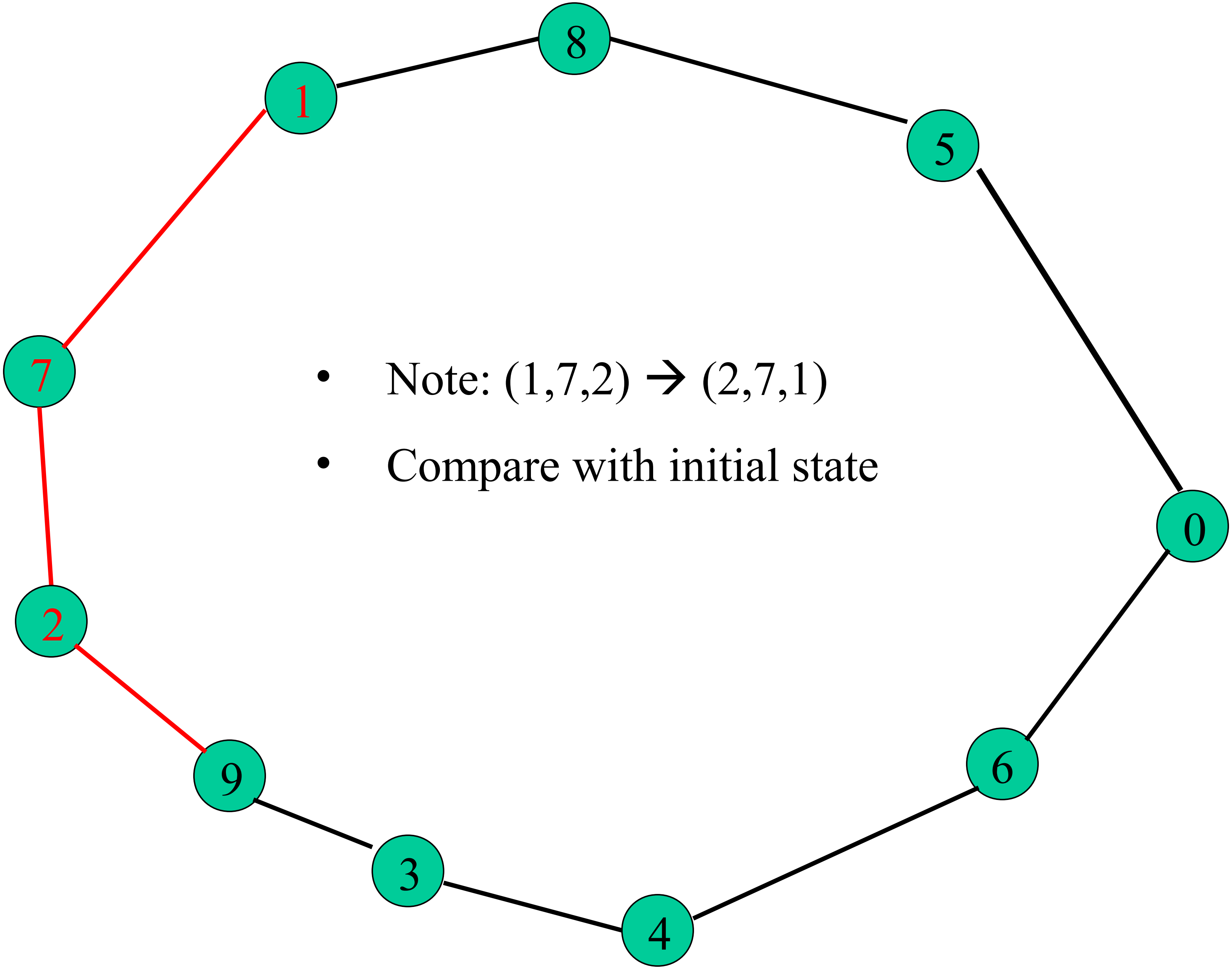
1. Reversing (1,7,2)
2. Execute another 4-flip.



1. Reversing (1,7,2)
2. Execute another 4-flip.



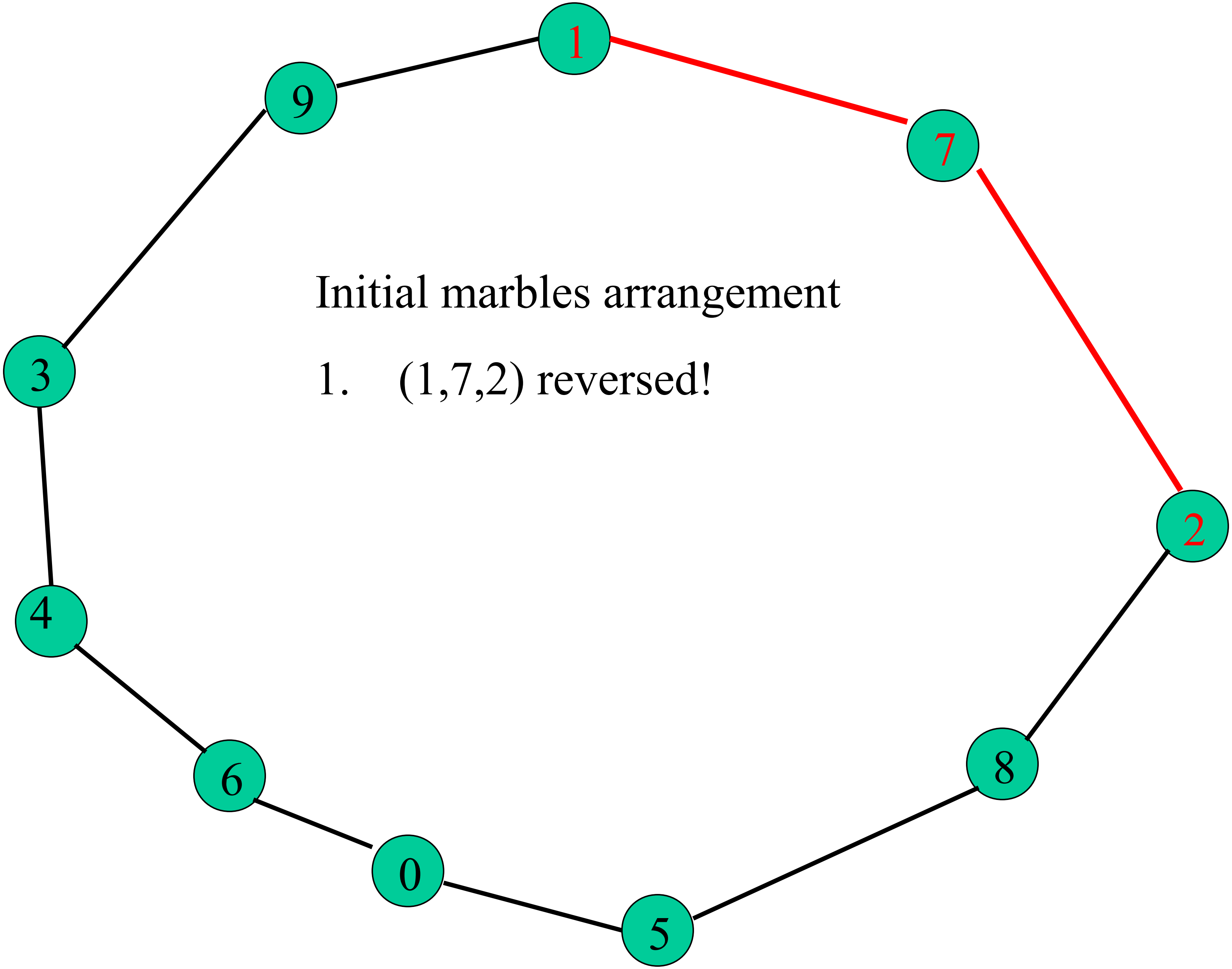
1. Reversing (1,7,2)
2. Execute another 4-flip.



- Note: (1,7,2) → (2,7,1)
- Compare with initial state

Initial marbles arrangement

1. (1,7,2) reversed!



Flipping two adjacent marbles.

- …e f g a b x y z ...→…e f g a z y x b...→…e f g x y z **a b**...
- After each pair of flips "ab" moves 3 positions "clockwise" while all other marbles remain in their original relative position.
- Stop when 1, 3 or 5 marbles are left between b and x.
- This will happen since there is an odd number of marbles (25 in our case) left to the right of b.
- Call "triple-exchange" 1, 3 or 5 times alternating start between a and b.
- Example:
- …a b e f g x y z…→ …a f e b g x y… → …e f a b g x y → …e f g b a x y…

- a b is now b a.
- Final solution: exchaneg any pair of adjacent marbles that are out of order.

finish...

- This means that any two consecutive marbles can be interchanged.
- But these exchanges generate all permutations.