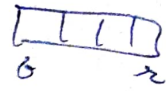
Assignment :

CQ insert
CQ delete
CQ display.

CQ insert :



① full → Pf (Overflow)

$f = 0$, $r = Max - 1$
or
$f = r + 1$

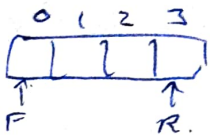
② space

empty ?
$f = r = -1$

not empty not full.
$f = 0$ $r \neq -1$

① check if Q is full

$f == (r+1) \% size$?



$f = (r+1) \% size$.

YES

Pf ("Overflow")

NO.

empty ($f = r = -1$?)

↓

$f \to f + 1$ (0)
$r \to r + 1$ (0)

$Q[r] = element$

↑ se d insert.

else
~~NENF.~~

$r \to (r+1) \% size$

$Q[r] = element$.

~~Testing~~

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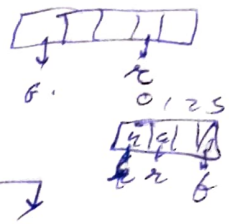
CQ delete.

① empty ?.
② delete the item ↑ ses the f.
③ 1 item to delete.



check if empty
(r = f = -1)

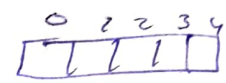
YES
↓
Pf ("Underflow)

NO
|
r = = f ?
delet item
set r = f = -1

else.
delete item
f = (f+1) % size

Display

int i = front.
① empty or not.
② display until (i != r)



If r = f = -1

YES
Pf (empty)

while (i != rear)
Pf (i)
i → (i+1) % size
exit
Pf (Q[rear])

Check!! (rear+1) % size

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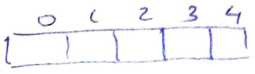
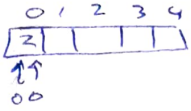
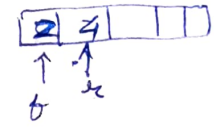
Tracing

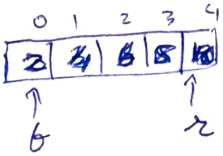


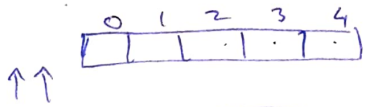
Inserting. (2, 4, 6, 8, 10)

	F	R
	-1	-1
①	0	0
②	0	1
③	0	4









$f = -1, r = -1.$

$(0+1) \% 5 = 1$

$r = 1$

$Q[1] = 4$

$r = 4$

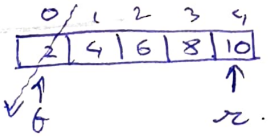
$Q[4] = 8$

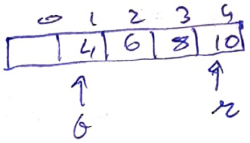
$0 == (4+1) \% 5$ True.

Pf (Q is full)

deleting.

F	R
0	4
1	4



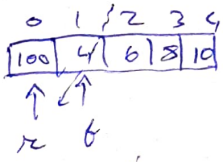


Is empty?
$f = -1 = r$?
NO

$r = f$ NO

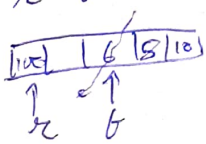
Insert.

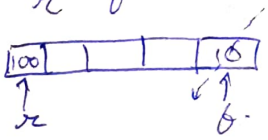
F	R
1	0
2	0
4	0
0	0
2	2
-1	-1



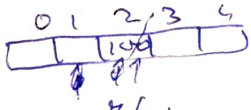
Is full?
$f = (r+1) \% \text{size}$? NO.

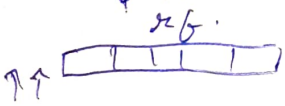
delete.





$f \to (f+1) \% \text{size}$.





Pf (empty).

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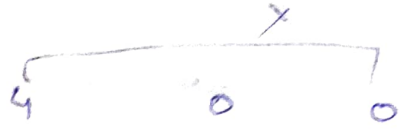
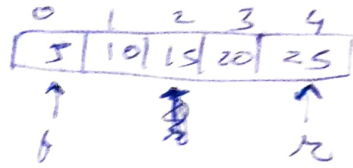
Display

r	f	i
-1	-1	

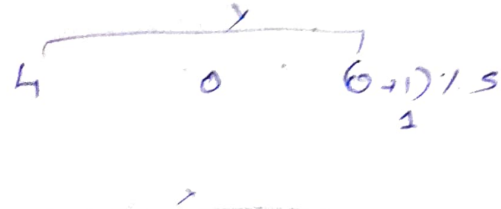
Pf (Underflow)

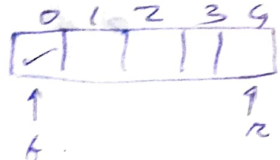
$i \to (i+1) / i_2$



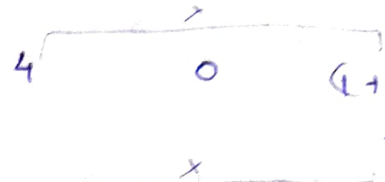


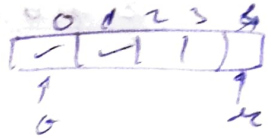
0	1	2	3	4
5	10	15	20	25
f				r





Pf (5)

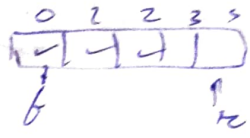




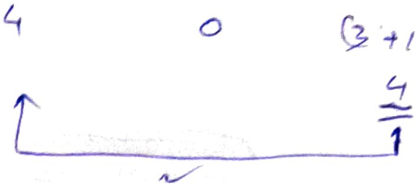
0	1	2	3	4
✓				
f				r

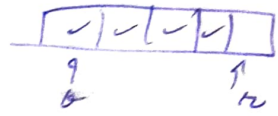
Pf (10)

0	1	2	3	4
✓	✓			
f				r



Pf (15)





0	1	2	3	4
✓	✓	✓		
f				r

Pf (20)

0	1	2	3	4
✓	✓	✓	✓	
f				r

exit.

4	0	0
4	0	(0+1) % 5 = 1
4	0	(1+1) % 5 = 2
4	0	(2+1) % 5 = 3
4	0	(3+1) % 5 = 4

Pf (rear) ⇒ // Pf (25)

exit)

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