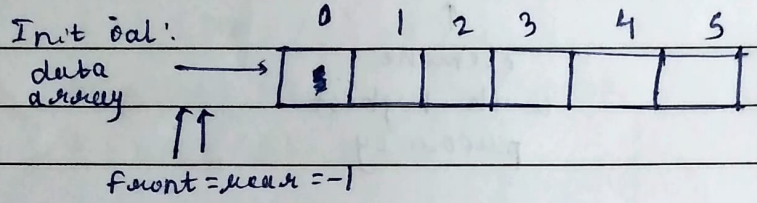
Q1. Define the following terms with example.

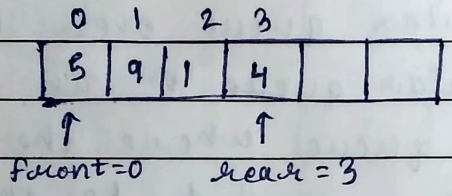
1. Linear Queue:

Ans.. Linear queue is a list, where items are inserted at one end (the rear) and deleted from the other end.

eg: → Initial:

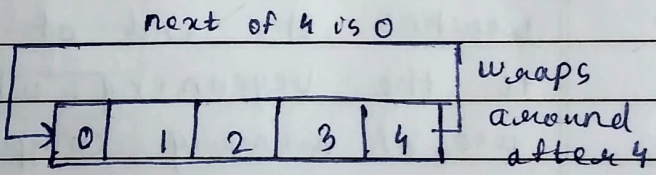


→ After insertion of elements:-

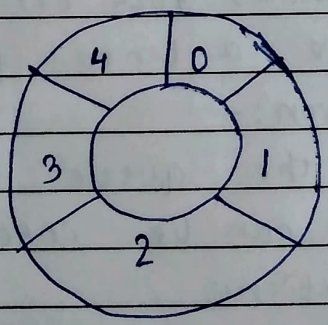


2. Circular queue:

- A circular queue is an extended version of a normal queue where the last element of the queue is connected to the first element of the queue forming a circle.



eg:



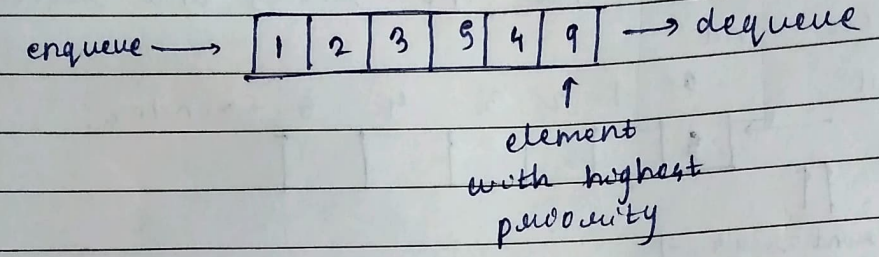
A circular array

3. Priority queue:

- Priority queue is an ordered list of homogenous elements.
- In a priority queue service is not provided

on the basis of "first-come-first-served" but rather than each element has a priority based on urgency of need.

eg:



Q2. What is circular queue? Explain the advantages of ~~circular~~ circular queue over linear queue?

Ans.. A ~~circular~~ circular queue is an extended version of a normal queue where the last element of the queue is connected to the first element of the queue forming a circle.

→ Advantages of circular queue over linear queue:-

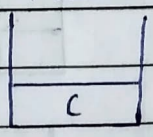
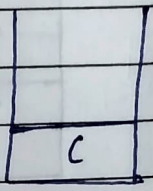
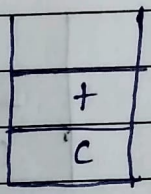
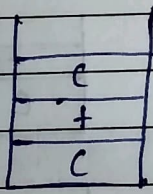
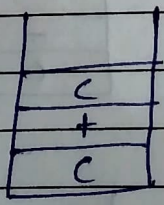
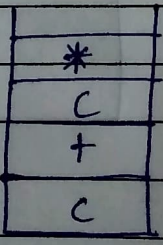
1. Efficient use of memory:-
   - In a circular queue, when the rear pointer reaches the end of the queue, it wraps around to the beginning, which allows for efficient use of memory compared to a linear queue.
2. Easier for insertion-deletion:-
   - In the circular queue, if the queue is not fully occupied, then the elements can be inserted easily in the vacant locations.
   - But in the case of a linear queue, ~~it~~ insertion is not possible once the rear pointer reaches the last index even if there are empty locations present in the queue.
3. Improved flexibility:-
   - With a circular queue, the front and rear pointers can move in either direction.

allowing for greater flexibility in implementing queue operations.

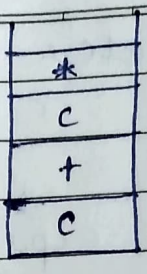
Q3. Convert the infix expression from infix to postfix.

(a+(b*c/d)-e)

Ans.

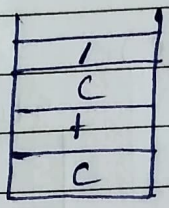
	Expression	Stack	Output
1)	a+(b*c/d)-e)		
2)	+(b*c/d)-e)		a
3)	(b*c/d)-e)		a
4)	b*c/d)-e)		a
5)	*c/d)-e)		ab
6)	c/d)-e)		ab

7) /d)-e)



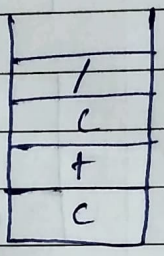
abc

8) d)-e)



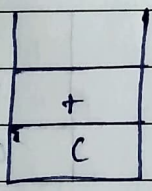
abc*

9))-e)



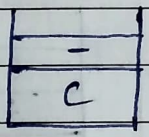
abc*d

10) -e)



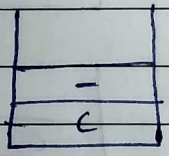
abc*d/

11) e)



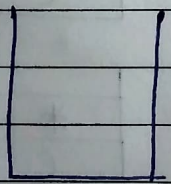
abc*d/+

12))



abc*d/+e

13)



abc*d/+e-

Q4. Represent the given polynomial expression using Generalized Linked List.

$P(x,y,z) = 9x^8y^2z + 4x^4y^3z^3 + x^6y^5z^4 + 8x^5y^2z + 7x^4y^6z + 4xyz + 3xz$

Ans. $P(x,y,z) = z(9x^8y^2 + 8x^5y^2) + 4x^4y^3z^3 + x^6y^5z^4 + 7x^4y^6z + z(4xy + 3x)$

$= z[y^2(9x^8 + 8x^5)] + 4x^4y^3z^3 + x^6y^5z^4 + \cancel{7x^4y^6z + z(4xy+3}$

$z(7x^4y^6 + 4xy + 3x)$