Assignment-4

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1. Write a program to insert and delete an element at the nth and kth position in a linked list where n and k is taken from user.

```
#include<stdio.h>
#include<stdlib.h>
struct node{
    int data;
    struct node* next;
};
struct node* head;
void insert(int data, int n){
node * temp = newnode;
temp -> data = data;
temp -> next = null;
if(n==1){
        temp -> next = head;
        head = temp;
        return;
}
void delete(int k){
struct node * temp = head;
if(k==1){
head = temp -> next;
free(temp);
```

```
return;
}
node *temp = head;
for (int i=0; i<n-0, i++) {
temp = temp->next;
}
temp -> next = temp -> next;
temp -> next = temp;
}
void print();
for (int i=0; i<c-0; i++)
temp = temp -> next;
free(temp);
}
int main() {
int n, x, t
head = Null;
printf("Enter the position for inserting");
scanf("%d", &n);
scanf("%d", &x);
Insert(x, n);
printf("Enter the position to delete");
scanf("%d", &t)
delete(t);
print(x);
```

return;

}

2) Construct a new linked list by merging alternate nodes of two lists. For example, in list 1 {1,2,3} and in list 2 {4,5,6} in new list 3 should have {1,4,2,5,3,6}

```
#include <stdio.h>
#include <stdlib.h>
struct node {
int data;
struct node* next;
};
void print list ( struct node* head)
{
printf("%d → ", (ptr → data);
ptr = ptr → next;
printf("Null \n");
}
void push ( struct node* head, int data)
{
struct node * new = (struct node*) malloc
(size of (struct node));
new → data = data;
new → next = *head;
*head = new;
```

```
struct node* merge (struct node*a, struct node*b)
{
struct node fake;
struct node* tail = fake;
  fake.next = null;
  while (1){
if (a == null)
{
  tail->next = b;
   break;
}else if (b==null)
{ tail -> next = a;
   break;
}
else
{
 tail -> next = a
 tail = a
 a = a -> next
 tail ->next = b;
}
}return fake.next;
}void main()
{
```

```
int keys[ ] = {1, 2, 3, 4, 5, 6, 7}
int n = size of (key1)/size of keys[0]
struct node * a = null ; * b = null ;
for (int i=n-i ; i>0 ; i = i-a)
    push (& a, keye[i]) ;
for (int i = n-2 ; i>=0 ; i = i-2)
    push (& b ; keys[j]) ;
struct node * head = merge (a, b) ;
  print list (head) ;
}
```

5) Find all the elements in the stack whose sum is equal to k.

A)
```
# include <stdio.h>
  void find (int arr[ ], int a , int k) {
   int total = 0
   int x=0, y=0 ;
   for (x!=0 ; x<a , x++) {
   while for (x=0 ; x<a , x++) {
   while (total <k , && y<a)
        total = arr[y]
            y++ ;
    if (total = =0)
    { printf ("find") ;
```

```
return ; }
total -= arr[x];
}
}
int main(void) {
int arr[] = {9,10,12,4,1,2};
int k = 565 ;
int a = sizeof(arr)/sizeof(arr[0]);
find (arr, a, k);
return 0;
}
```

4) A)

```
# include <stdio.h>
# define size 20
void insert(int);
void delete();
int queue[20], a=-1, b=-1;
void main() {
int num ; choice ;
while(1) {
printf("\n ° News \n");
printf(" 1. insert \n 2. delete \n 3. Print
\n 4. Reverse \n 5. Alternate \n 6 Exit);
printf("\n Enter your choice");
```

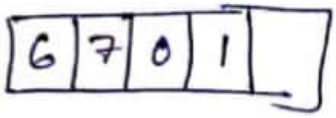
```
scanf("%d", &choice);
switch (choice) {
case 1: printf("Enter the num to insert: ");
  scanf("%d", &num);
  insert(num);
  break;
case 2: printf("Reverse queue");
    for (int i = size, i >= 0, i--)
      if (queue[i] == -1)
        continue;
    printf("%d", queue[i]);
  }
  break;
case 3:
    printf("Alternate elements");
      for (int i = 0, i < size, i >= 0, i += 2)
  { if (queue[i] == -1)
      continue;
    printf("%d", queue[i]);
  }
    break;
return 0;
}
```

5) i) Array vs linked lists

1) Both are the data structure. Both are used to store the data.

2) Cost of accessing the elements

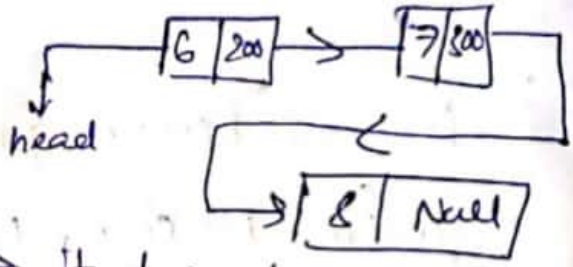
Arrays



⇒ it takes at constant time

O(1)

linked list



⇒ it depends on number of nodes in the linked list

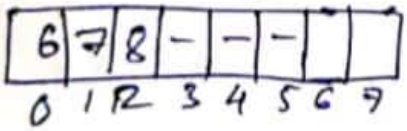
O(n)

3) Memory requirment and utilization.

Array

⇒ Ineffective in memory utilization

Ex:



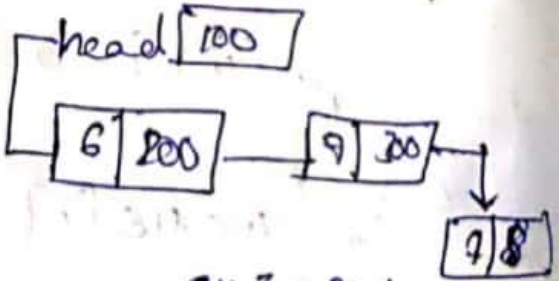
8 × 4 = 32 bytes

Used = 12

⇒ Require memory in less

linked list

⇒ it is in dynamic byte



8 × 3 = 24 byte

⇒ More requirement

4) Cost of insertion and cost of deletion

	Array	Linked list
Beginning	O(n)	O(1)
At end	O(1)	O(n)
ith position	O(n)	O(n)

5. Easy use and operations

Array	Linked list
→ easier to use	→ less easier
→ linear and binary	→ linear

(ii)
```
#include <stdio.h>
#include <stdlib.h>
int len[int fa()]
{
int i=0, x, y=0
  while(1)
  {
    if(x[i])
    {
      xy++, i++;
  }
else
  {
    break;
  }
```

```
}
return xy;
}
void changeList (int x[], int a[])
{
    for (int i=len(x)-1, i>=0, i--)
    {
        x[i+1] = x[i]
    }
  x[0] = a[0];
  printf("\n Elements of old anay: \n");
for (int i = 0; i<len(x); i++).
    { printf("%d", x[i]);
    }
  for (int i=0, i<len(y); i++)
    {
        y[i] = y[i+1];
    }
  printf("\n Elements of newanay: \n")
  for (int 1=0; i<len(a); i++)
  {
  printf("% d", a[i]);
  }
int main()
```

```
{ int x[10] = {1,2,3}, a[10] = {4,5,6};
  Change list = ('a','b');
}
```