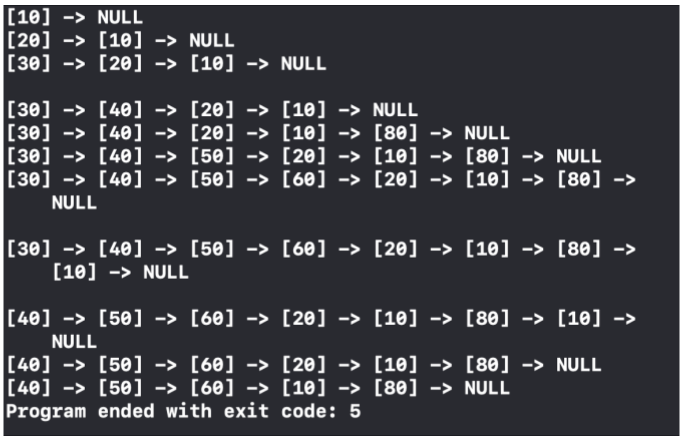
<단순연결리스트>

```c
#include <stdio.h>
#include <stdlib.h>
typedef struct ListNode
{
	int data;
	struct ListNode* link;
}ListNode;
typedef struct
{
	ListNode*head;
}LinkedListType;

void init(LinkedListType* L)
{
	L-> head = NULL;
}

void addFirst(LinkedListType* L, int item)
{
	ListNode* node = (ListNode*)malloc(sizeof(ListNode));
	node-> data = item;
	node-> link = L-> head;
	L->head = node;
}

void add(LinkedListType* L, int pos, int item)
{
	ListNode* node = (ListNode*)malloc(sizeof(ListNode));
	ListNode* before = L-> head;
	for(int i = 0;i < pos-1; i++)
	{
		before = before-> link;
	}
	node -> data = item;
	node-> link = before-> link;
	before->link = node;
}

void addLast(LinkedListType*L, int item)
{
	ListNode* node = (ListNode*)malloc(sizeof(ListNode));
	node-> data = item;
	node-> link = NULL;
	int count = 0;
	for(ListNode*p = L-> head; p!= NULL; p = p->link)
	{
		count++;
	}
	ListNode* q = L-> head;

	for(int i = 0;i < count-1; i++)
	{
		q = q->link;
	}
	q->link = node;
}

int get(LinkedListType* L, int pos)
{
	ListNode* p = L-> head;
	for(int i = 1; i <pos; i ++)
	{
		p = p->link;
	}
	return p->data;
}

void set(LinkedListType* L, int pos, int item)
{
	ListNode* p = L->head;
	for(int i =1; i<pos;i++)
	{
		p=p->link;
	}
	p -> data = item;
}

void remove1(LinkedListType*L, int pos)
{
	ListNode*before = L->head;
	for(int i = 0; i< pos-1;i++)
	{
		before = before->link;
	}
	ListNode * next = before;
	next = next->link;
	next = next->link;
	before->link = next;
}
void removeFirst(LinkedListType*L)
{
	ListNode*p = L->head;
	p = p->link;
	L->head = p;
}

void removeLast(LinkedListType*L)
{
	int count = 0;
	for(ListNode*p = L-> head; p!= NULL; p = p->link)
	{
		count++;
	}
	ListNode* q = L-> head;
	for(int i = 1;i<=count-2; i++)
	{
		q = q->link;
	}
	q->link = NULL;
}
```

```
void printList(LinkedListType* L)
{
	for(ListNode* p = L->head; p!=NULL; p=p->link)
	{
		printf("[%d] -> ", p->data);
	}
	printf("NULL\n");
}

void main()
{
	LinkedListType list;
	init(&list);

	addFirst(&list,10); printList(&list);
	addFirst(&list,20); printList(&list);
	addFirst(&list,30); printList(&list);

	getchar();
	add(&list, 1, 40); printList(&list);
	add(&list, 4, 80); printList(&list);
	add(&list, 2, 50); printList(&list);
	add(&list, 3, 60); printList(&list);
	getchar();
	addLast(&list, 10); printList(&list);
	getchar();
	removeFirst(&list); printList(&list);
	removeLast(&list); printList(&list);
	remove1(&list, 3); printList(&list);
	//int pos;
	//printf("\n몇 번 노드의 값을 반환할까요? ");
	//scanf("%d", &pos);
	//printf("%d번 노드의 값은 %d\n", pos, get(&list, pos));

}
```
결과:



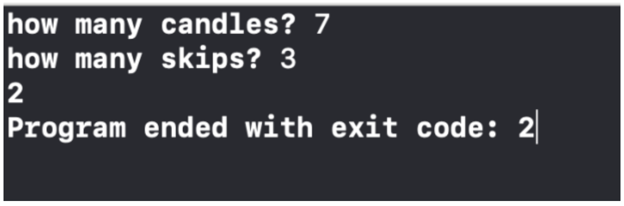
```
[10] -> NULL
[20] -> [10] -> NULL
[30] -> [20] -> [10] -> NULL

[30] -> [40] -> [20] -> [10] -> NULL
[30] -> [40] -> [20] -> [10] -> [80] -> NULL
[30] -> [40] -> [50] -> [20] -> [10] -> [80] -> NULL
[30] -> [40] -> [50] -> [60] -> [20] -> [10] -> [80] ->
    NULL

[30] -> [40] -> [50] -> [60] -> [20] -> [10] -> [80] ->
    [10] -> NULL

[40] -> [50] -> [60] -> [20] -> [10] -> [80] -> [10] ->
    NULL
[40] -> [50] -> [60] -> [20] -> [10] -> [80] -> NULL
[40] -> [50] -> [60] -> [10] -> [80] -> NULL
Program ended with exit code: 5
```

<생일 케이크 배열 ver1>

```
#include <stdio.h>
#include <stdlib.h>
void buildList(int A[], int n)
{
	for(int i = 0; i<n; i++)
	{
		A[i] = i+1;
```

```
        }
}

int runSimulation(int A[], int n, int k)
{
        int r = 0;
        int N = n;
        while(n>1)
        {
                int i = 0;
                while(i<k)
                {
                        r = (r+1)%N;
                        if(A[r] != 0)
                                i++;
                }
                A[r] = 0;
                n--;
                while(A[r] == 0)
                {
                        r = (r+1) % N;
                }
        }
        return A[r];
}
int candle(int A[], int n, int k)
{
        buildList(A, n);
        return runSimulation(A, n, k);
}

void main()
{
        int n,k;
        printf("how many candles? ");
        scanf("%d", &n);
        printf("how many skips? ");
        scanf("%d", &k);
        int A[n];
        printf("%d\n", candle(A, n, k));
}
```

결과:



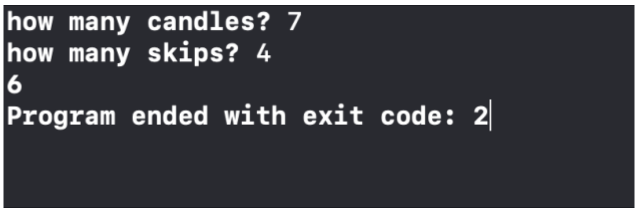
```
how many candles? 7
how many skips? 3
2
Program ended with exit code: 2
```

'

<생일 케이크 배열 ver2>

```
#include <stdio.h>
#include <stdlib.h>
void buildList(int A[], int n)
{
        for(int i = 0; i<n; i++)
        {
                A[i] = i+1;
        }
}
void remove1(int A[], int n, int r)
{
        for(int i = r; i<n; i++)
        {
                A[i] = A[i+1];
        }
}
int runSimulation(int A[], int n, int k)
{
        int r = 0;
        while(n>1)
        {
                r = (r+k) %n;
                remove1(A, n, r);
                n--;
        }
        return A[0];
}


int candle(int A[], int n, int k)
{
        buildList(A, n);
        return runSimulation(A, n, k);

}

void main()
{
        int n,k;
        printf("how many candles? ");
        scanf("%d", &n);
        printf("how many skips? ");
        scanf("%d", &k);
        int A[n];
        printf("%d\n", candle(A, n, k));



}
```

결과:



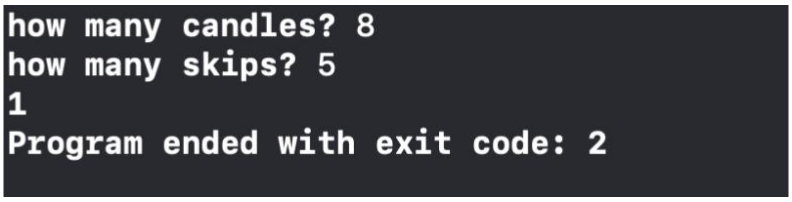
```
how many candles? 7
how many skips? 4
6
Program ended with exit code: 2
```

<생일 케이크 원형연결리스트>

```
#include <stdio.h>
#include <stdlib.h>

typedef struct ListNode
{
	int data;
	struct ListNode* link;
}ListNode;

typedef struct{
	ListNode* head;
}LinkedListType;

void init(LinkedListType* L)
{
	L-> head = NULL;
}

void buildList(LinkedListType* L, int n)
{
	ListNode* p = (ListNode*)malloc(sizeof(ListNode));
	L-> head = p;
	p->data = 1;
	for(int i = 2; i<=n; i++)
	{
		p->link = (ListNode*)malloc(sizeof(ListNode));
		p = p->link;
		p-> data = i;
	}
	p-> link = L->head;

}
int runSimulation(LinkedListType* L, int n, int k)
{
	ListNode*p = L-> head;
	while(p!= p->link)
	{
		for(int i=1;i<k;i++)
		{
			p = p->link;
		}
		ListNode* pnext = p->link;
		p->link = pnext -> link;
		free(pnext);
		p = p->link;
	}
	return p->data;

}

int candle(int n, int k)
{
	LinkedListType list;
	init(&list);
	buildList(&list, n);
	return runSimulation(&list, n, k);
}

void main()
{

	int n,k;
```

```
        printf("how many candles? ");
        scanf("%d", &n);
        printf("how many skips? ");
        scanf("%d", &k);
        printf("%d\n", candle(n, k));
}
```

결과:



```
how many candles? 8
how many skips? 5
1
Program ended with exit code: 2
```