Trạng thái	Đã xong
Bắt đầu vào lúc	Thứ Ba, 11 tháng 2 2025, 2:48 PM
Kết thúc lúc	Chủ Nhật, 23 tháng 2 2025, 11:47 PM
Thời gian thực	12 Các ngày 8 giờ
hiện	
Điểm	7,00/8,00
Điểm	8,75 trên 10,00 (87,5 %)

```
Câu hỏi 1
Sai
Đạt điểm 1,00 trên 1,00
```

Implement methods **add**, **size** in template class **SLinkedList** (**which implements List ADT**) representing the singly linked list with type T with the initialized frame. The description of each method is given in the code.

```
template <class T>
class SLinkedList {
public:
   class Node; // Forward declaration
protected:
   Node* head;
   Node* tail;
   int count;
public:
   SLinkedList();
    ~SLinkedList();
          add(T e);
    void
          add(int index, T e);
    void
    int
         size();
public:
   class Node {
    private:
       T data;
       Node* next;
       friend class SLinkedList<T>;
    public:
       Node() {
           next = 0;
       Node(Node* next) {
           this->next = next;
       Node(T data, Node* next) {
           this->data = data;
           this->next = next;
    };
};
```

For example:

Test	Result
<pre>SLinkedList<int> list; int size = 10;</int></pre>	[0,1,2,3,4,5,6,7,8,9]
<pre>for(int index = 0; index < size; index++){ list.add(index); }</pre>	
<pre>cout << list.toString();</pre>	
<pre>SLinkedList<int> list; int size = 10;</int></pre>	[9,8,7,6,5,4,3,2,1,0]
<pre>for(int index = 0; index < size; index++){ list.add(0, index); }</pre>	
<pre>cout << list.toString();</pre>	

Answer: (penalty regime: 0, 0, 0, 5, 10, 15, ... %)

Reset answer

```
#ifndef SLINKEDLIST_H
#define SLINKEDLIST H
```

```
3
    template <class T>
    class SLinkedList {
5
    private:
 6
7
        struct Node {
8
            T data;
9
            Node* next;
10
            Node(const T& value) : data(value), next(nullptr) {}
11
12
        Node* head;
13
14
        Node* tail;
15
        int count;
16
17
    public:
18
        SLinkedList() : head(nullptr), tail(nullptr), count(0) {}
19
20
        ~SLinkedList() {
            Node* current = head;
21
22 ,
            while (current) {
                Node* temp = current;
23
24
                current = current->next;
25
                delete temp;
26
            }
27
        }
28
        void add(const T& e);
29
30
        void add(int index, const T& e);
31
        int size();
32
    };
33
    // Implementation in SLinkedList.cpp
34
35
    #endif // SLINKEDLIST_H
36
```

Syntax Error(s)



Marks for this submission: 0,00/1,00. Accounting for previous tries, this gives 1,00/1,00.

1.

```
Câu hỏi 2
Đúng
Đạt điểm 1,00 trên 1,00
```

Implement methods get, set, empty, indexOf, contains in template class SLinkedList (which implements List ADT) representing the singly linked list with type T with the initialized frame. The description of each method is given in the code.

```
template <class T>
class SLinkedList {
public:
   class Node; // Forward declaration
protected:
   Node* head;
   Node* tail;
   int count;
public:
   SLinkedList(): head(NULL), tail(NULL), count(0);
   ~SLinkedList() { };
   void
           add(T e);
   void
           add(int index, T e);
   int
           size();
          empty();
   bool
           get(int index);
         set(int index, T e);
   void
          indexOf(T item);
   bool contains(T item);
public:
   class Node {
   private:
       Node* next;
       friend class SLinkedList<T>;
   public:
       Node() {
           next = 0;
       Node(Node* next) {
           this->next = next;
        }
       Node(T data, Node* next = NULL) {
           this->data = data;
           this->next = next;
   };
};
```

For example:

Test	Result
SLinkedList <int> list;</int>	[8,15,2,4,7,10,40,6]
int values[] = {10, 15, 2, 6, 4, 7, 40, 8};	
int index[] = $\{0, 0, 1, 3, 2, 3, 5, 0\}$;	
int expvalues[]= {8, 15, 2, 4, 7, 10, 40, 6};	
<pre>for (int idx = 0; idx < 8; idx++){ list.add(index[idx], values[idx]); }</pre>	
<pre>assert(list.size() == 8);</pre>	
<pre>for (int idx = 0; idx < 8; idx++){ assert(list.get(idx) == expvalues[idx]); }</pre>	
<pre>cout << list.toString();</pre>	
SLinkedList <int> list;</int>	[]
<pre>assert(list.empty() == true); cout << list.toString();</pre>	

Answer: (penalty regime: 0, 0, 0, 5, 10, 15, ... %)

Reset answer

```
1
    template <class T>
 2
    T SLinkedList<T>::get(int index) {
        if (index < 0 \mid \mid index >= count) {
3 🔻
            throw std::out_of_range("Index out of range!");
5
6
        Node* current = head;
7
8
        for (int i = 0; i < index; i++) {</pre>
            current = current->next;
9
10
11
        return current->data;
12
    }
13
14
    template <class T>
    void SLinkedList<T>::set(int index, const T& e) {
15
16 •
        if (index < 0 || index >= count) {
            throw std::out_of_range("Index out of range!");
17
18
19
20
        Node* current = head;
21 •
        for (int i = 0; i < index; i++) {</pre>
22
            current = current->next;
23
24
        current->data = e;
25
26
27
    template <class T>
28 v bool SLinkedList<T>::empty() {
29
        return count == 0;
30
31
32
    template <class T>
    int SLinkedList<T>::indexOf(const T& item) {
33 ▼
        Node* current = head;
34
35
        int index = 0;
36
37
        while (current) {
38 ,
            if (current->data == item) {
39
                return index;
40
            }
41
            current = current->next;
42
            index++;
43
44
45
        return -1; // Not found
46
47
48
    template <class T>
     haal Clinkadlict/Tx...contains/const TR itam\ {
```

```
return indexOf(item) != -1;

51

52
```

	Test	Expected	Got	
~	<pre>SLinkedList<int> list; int values[] = {10, 15, 2, 6, 4, 7, 40, 8}; int index[] = {0, 0, 1, 3, 2, 3, 5, 0}; int expvalues[] = {8, 15, 2, 4, 7, 10, 40, 6}; for (int idx = 0; idx < 8; idx++){ list.add(index[idx], values[idx]); } assert(list.size() == 8); for (int idx = 0; idx < 8; idx++){ assert(list.get(idx) == expvalues[idx]); } cout << list.toString();</int></pre>	[8,15,2,4,7,10,40,6]	[8,15,2,4,7,10,40,6]	>
~	<pre>SLinkedList<int> list; assert(list.empty() == true); cout << list.toString();</int></pre>	[]	[]	~

Passed all tests! 🗸



Marks for this submission: 1,00/1,00.

1.

```
Câu hỏi 3
Đúng
Đạt điểm 1,00 trên 1,00
```

Implement methods removeAt, removeItem, clear in template class SLinkedList (which implements List ADT) representing the singly linked list with type T with the initialized frame. The description of each method is given in the code.

```
template <class T>
class SLinkedList {
public:
   class Node; // Forward declaration
protected:
   Node* head;
   Node* tail;
   int count;
public:
   SLinkedList();
   ~SLinkedList();
   void
           add(T e);
   void
           add(int index, T e);
   int
           size();
          empty();
   bool
   int
           size();
         clear();
   void
           get(int index);
   void set(int index, T e);
          indexOf(T item);
   int
   bool contains(T item);
           removeAt(int index);
          removeItem(T item);
   bool
public:
   class Node {
   private:
       T data;
       Node* next;
       friend class SLinkedList<T>;
   public:
       Node() {
           next = 0;
       }
       Node(Node* next) {
           this->next = next;
       Node(T data, Node* next = NULL) {
           this->data = data;
           this->next = next;
   };
};
```

For example:

Test	Result
SLinkedList <int> list;</int>	[1,2,3,4,5,6,7,8,9]
for (int i = 0; i < 10; ++i) { list.add(i);	
<pre>assert(list.get(0) == list.removeAt(0));</pre>	
<pre>cout << list.toString();</pre>	

Test	Result
SLinkedList <int> list;</int>	[0,1,2,3,4,5,6,7,8]
<pre>for (int i = 0; i < 10; ++i) { list.add(i); }</pre>	
<pre>assert(list.get(9) == list.removeAt(9));</pre>	
<pre>cout << list.toString();</pre>	
SLinkedList <int> list;</int>	[0,1,2,3,4,5,6,7,8]
<pre>for (int i = 0; i < 10; ++i) { list.add(i); }</pre>	
assert(list.removeItem(9));	
<pre>cout << list.toString();</pre>	

Answer: (penalty regime: 0 %)

Reset answer

```
template <class T>
 1
 2 * T SLinkedList<T>::removeAt(int index) {
3 ▼
        if (index < 0 || index >= count) {
4
            throw std::out_of_range("Index is out of range");
5
        }
6
 7
        Node* temp;
8
        T removedValue;
9
10 🔻
        if (index == 0) { // Remove the head
11
            temp = head;
            head = head->next;
12
13
            removedValue = temp->data;
14
            delete temp;
15
            if (count == 1) tail = nullptr; // If last element removed, update tail
16
        } else {
17
            Node* prev = head;
            for (int i = 0; i < index - 1; i++) {
18
19
                prev = prev->next;
20
21
            temp = prev->next;
22
            removedValue = temp->data;
23
            prev->next = temp->next;
            if (temp == tail) tail = prev; // If removing tail, update tail pointer
24
25
            delete temp;
26
        }
27
28
        count--;
29
        return removedValue;
30
31
    template <class T>
32
33 v bool SLinkedList<T>::removeItem(const T& item) {
        if (!head) return false; // Empty list
34
35
36
        if (head->data == item) { // Remove head
37
            Node* temp = head;
38
            head = head->next;
39
            delete temp;
40
            if (--count == 0) tail = nullptr; // If last element removed, update tail
41
            return true;
42
        }
43
44
        Node* prev = head;
45
        Node* current = head->next;
46
        while (current) {
47
            if (current->data == item) {
48
                prev->next = current->next;
                if (current == tail) tail = prev; // If removing tail, update tail pointer
49
50
                delete current;
51
                count--;
52
                return true;
53
```

	Test	Expected	Got	
~	SLinkedList <int> list;</int>	[1,2,3,4,5,6,7,8,9]	[1,2,3,4,5,6,7,8,9]	~
	<pre>for (int i = 0; i < 10; ++i) { list.add(i); } assert(list.get(0) == list.removeAt(0));</pre>			
	<pre>cout << list.toString();</pre>			
~	SLinkedList <int> list;</int>	[0,1,2,3,4,5,6,7,8]	[0,1,2,3,4,5,6,7,8]	~
	<pre>for (int i = 0; i < 10; ++i) { list.add(i); } assert(list.get(9) == list.removeAt(9));</pre>			
	<pre>cout << list.toString();</pre>			

Passed all tests! 🗸

Đúng

Marks for this submission: 1,00/1,00.

1.

```
Câu hỏi 4
Đúng
Đạt điểm 1,00 trên 1,00
```

Class LLNode representing a node of singly linked lists is declared as below:

```
class LLNode {
public:
    int val;
    LLNode* next;
    LLNode(); // Constructor: val = 0, next = nullptr
    LLNode(int val, LLNode* next); // Constructor with customized data
}
```

Given a singly linked list head node.

Your task is to implement a function with following prototype:

```
LLNode* reverseLinkedList(LLNode* head);
```

The function returns head node of the reversed singly linked list.

Note:

- The iostream library has been included and namespace std is being used. No other libraries are allowed.
- The constructors and methods of class LLNode have been defined fully so you do not need to redefine them.
- You can write helper functions.

For example:

Test	Result
<pre>int arr[] = {13, 88, 60, 7, 192}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head);</pre>	[13, 88, 60, 7, 192] [192, 7, 60, 88, 13]
<pre>LLNode::printList(newhead); newhead->clear();</pre>	

Answer: (penalty regime: 0 %)

Reset answer

```
1 LLNode* reverseLinkedList(LLNode* head) {
 2
        LLNode* prev = nullptr;
        LLNode* current = head;
 3
        LLNode* nextNode = nullptr;
4
5
6 •
        while (current) {
7
            nextNode = current->next; // Store next node
8
            current->next = prev; // Reverse link
9
            prev = current; // Move prev to current
10
            current = nextNode; // Move to next node
        }
11
12
13
        return prev; // New head of the reversed list
14
    }
15
```

	Test	Expected	Got	
~	<pre>int arr[] = {13, 88, 60, 7, 192}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear();</pre>	[13, 88, 60, 7, 192] [192, 7, 60, 88, 13]	[13, 88, 60, 7, 192] [192, 7, 60, 88, 13]	~
~	<pre>int arr[] = {}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear();</pre>		[]	~
~	<pre>int arr[] = {31, 22, 46, 152, 14, 87, 196, 97, 5, 93}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear();</pre>	[31, 22, 46, 152, 14, 87, 196, 97, 5, 93] [93, 5, 97, 196, 87, 14, 152, 46, 22, 31]	[31, 22, 46, 152, 14, 87, 196, 97, 5, 93] [93, 5, 97, 196, 87, 14, 152, 46, 22, 31]	\
~	<pre>int arr[] = {115, 59, 178, 39, 109, 18, 154, 106, 94, 174, 51, 33, 132, 195, 161, 37, 61, 107, 120, 190}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear();</pre>	[115, 59, 178, 39, 109, 18, 154, 106, 94, 174, 51, 33, 132, 195, 161, 37, 61, 107, 120, 190] [190, 120, 107, 61, 37, 161, 195, 132, 33, 51, 174, 94, 106, 154, 18, 109, 39, 178, 59, 115]	[115, 59, 178, 39, 109, 18, 154, 106, 94, 174, 51, 33, 132, 195, 161, 37, 61, 107, 120, 190] [190, 120, 107, 61, 37, 161, 195, 132, 33, 51, 174, 94, 106, 154, 18, 109, 39, 178, 59, 115]	~

				Т
	Test	Expected	Got	
/	int arr[] = {104, 50, 154, 40, 15, 171, 56, 114,	[104, 50, 154, 40, 15, 171,	[104, 50, 154, 40, 15, 171,	~
	67, 90, 46, 179, 152, 177, 139, 45, 18, 55, 38,	56, 114, 67, 90, 46, 179,	56, 114, 67, 90, 46, 179,	
	158, 8, 157, 143, 37, 16, 83, 173, 82, 156, 51,	152, 177, 139, 45, 18, 55,	152, 177, 139, 45, 18, 55,	
	124, 25, 68, 51, 194, 105, 44, 17, 97, 0, 150,	38, 158, 8, 157, 143, 37,	38, 158, 8, 157, 143, 37,	
	66, 71, 81, 11, 180, 148, 160, 127, 93, 108, 13,	16, 83, 173, 82, 156, 51,	16, 83, 173, 82, 156, 51,	
	122, 172, 39, 88, 62, 38, 61, 156, 45, 131, 69,	124, 25, 68, 51, 194, 105,	124, 25, 68, 51, 194, 105,	
	191, 123, 42, 103, 56, 69, 138, 185, 162, 192,	44, 17, 97, 0, 150, 66, 71,	44, 17, 97, 0, 150, 66, 71,	
	147, 71, 80, 12, 36, 191, 121, 194, 86, 92, 183,	81, 11, 180, 148, 160, 127,	81, 11, 180, 148, 160, 127,	
	164, 97, 185, 130, 29, 174, 112, 194, 185, 132,	93, 108, 13, 122, 172, 39,	93, 108, 13, 122, 172, 39,	
	27, 197, 158, 151, 51, 174};	88, 62, 38, 61, 156, 45,	88, 62, 38, 61, 156, 45,	
	LLNode* head = LLNode::createWithIterators(arr,	131, 69, 191, 123, 42, 103,	131, 69, 191, 123, 42, 103,	
	<pre>arr + sizeof(arr) / sizeof(int));</pre>	56, 69, 138, 185, 162, 192,	56, 69, 138, 185, 162, 192,	
	LLNode::printList(head);	147, 71, 80, 12, 36, 191,	147, 71, 80, 12, 36, 191,	
	cout << "\n";	121, 194, 86, 92, 183, 164,	121, 194, 86, 92, 183, 164,	
	<pre>LLNode* newhead = reverseLinkedList(head);</pre>	97, 185, 130, 29, 174, 112,	97, 185, 130, 29, 174, 112,	
	<pre>LLNode::printList(newhead);</pre>	194, 185, 132, 27, 197,	194, 185, 132, 27, 197,	
	newhead->clear();	158, 151, 51, 174]	158, 151, 51, 174]	
		[174, 51, 151, 158, 197,	[174, 51, 151, 158, 197,	
		27, 132, 185, 194, 112,	27, 132, 185, 194, 112,	
		174, 29, 130, 185, 97, 164,	174, 29, 130, 185, 97, 164,	
		183, 92, 86, 194, 121, 191,	183, 92, 86, 194, 121, 191,	
		36, 12, 80, 71, 147, 192,	36, 12, 80, 71, 147, 192,	
		162, 185, 138, 69, 56, 103,	162, 185, 138, 69, 56, 103,	
		42, 123, 191, 69, 131, 45,	42, 123, 191, 69, 131, 45,	
		156, 61, 38, 62, 88, 39,	156, 61, 38, 62, 88, 39,	
		172, 122, 13, 108, 93, 127,	172, 122, 13, 108, 93, 127,	
		160, 148, 180, 11, 81, 71,	160, 148, 180, 11, 81, 71,	
		66, 150, 0, 97, 17, 44,	66, 150, 0, 97, 17, 44,	
		105, 194, 51, 68, 25, 124,	105, 194, 51, 68, 25, 124,	
		51, 156, 82, 173, 83, 16,	51, 156, 82, 173, 83, 16,	
		37, 143, 157, 8, 158, 38,	37, 143, 157, 8, 158, 38,	
		55, 18, 45, 139, 177, 152,	55, 18, 45, 139, 177, 152,	
		179, 46, 90, 67, 114, 56,	179, 46, 90, 67, 114, 56,	
		171, 15, 40, 154, 50, 104]	171, 15, 40, 154, 50, 104]	

int arr[] = {106, 14, 71, 71, 166, 172, 128, 128, 52, 113, 58, 184, 70, 73, 37, 83, 71, 46, 133, 100, 37, 186, 199, 69, 79, 71, 70, 13, 155, 90, 60, 82, 180, 125, 108, 160, 74, 93, 72, 152, 106, 11, 174, 164, 168, 6, 9, 41, 58, 65, 141, 22, 103, 49, 114, 197, 175, 131, 109, 135, 124, 19, 76, 109, 130, 15, 120, 12, 11, 77, 88, 56, 127, 162, 67, 133, 162, 22, 94, 122, 53, 132, 167, 111, 138, 61, 169, 64, 98, 159, 58, 147, 137, 50, 193, 190, 173, 28, 35, 108, 138, 110, 184, 82, 114, 199, 137, 156, 155, 167, 165, 134, 193, 22, 173, 176, 46, 61, 196, 137, 151, 69, 67, 87, 161, 72, 60, 70, 67, 109, 149, 16, 38, 127, 15, 12, 107, 48, 184, 185, 43, 178, 14, 188, 61, 79, 189, 144, 27, 41, 114, 182, 118, 76, 89, 126, 124, 195, 180, 133, 118, 96, 61, 95, 127, 40, 62, 102, 130, 174, 47, 131, 187, 103, 88, 109, 153, 110, 184, 72, 178, 41, 93, 112, 24, 156, 180, 150, 114, 172, 43, 170, 46, 166, 109, 193, 13, 17, 190, 153, 80, 106, 199, 163, 106, 39, 85, 56, 174, 189, 61, 72, 154, 149, 59, 110, 139, 189, 99, 40, 84, 180, 23, 13, 9, 192, 163, 88, 1, 3, 149, 132, 36, 34, 120, 40, 48, 32, 91, 166, 42, 155, 30, 111, 140, 6, 189, 169, 50, 15, 144, 67, 145, 169, 49, 135, 49, 76, 0, 105, 90, 60, 75, 88, 150, 88, 122, 11, 158, 12, 43, 182, 152, 112, 65, 149, 14, 194, 146, 120, 114, 178, 177, 159, 105, 45, 169, 152, 150, 60, 99, 39, 73, 101, 162, 173, 127, 122, 157, 116, 139, 57, 101, 121, 45, 133, 151, 171, 186, 186, 116, 4, 173, 118, 103, 70, 133, 158, 119, 47, 142, 111, 110, 96, 68, 118, 153, 178, 174, 130, 176, 186, 23, 193, 40, 175, 107, 184, 168, 185, 56, 167, 169, 68, 42, 75, 26, 174, 92, 46, 18, 85, 131, 164, 15, 116, 197, 88, 143, 8, 115, 199, 173, 142, 139, 162, 62, 7, 33, 2, 4, 54, 22, 135, 194, 34, 17, 90, 154, 71, 6, 156, 76, 66, 172, 157, 39, 92, 68, 169, 117, 166, 86, 153, 106, 63, 142, 190, 149, 58, 31, 19, 114, 35, 110, 108, 103, 27, 139, 97, 166, 186, 164, 55, 19, 133, 194, 153, 38, 8, 87, 35, 179, 5, 32, 143, 104, 86, 184, 116, 70, 39, 22, 172, 28, 40, 72, 116, 192, 17, 159, 169, 143, 167, 77, 25, 128, 102, 140, 120, 140, 71, 56, 76, 16, 13, 144, 91, 166, 2, 74, 164, 153, 71, 37, 187, 104, 172, 122, 9, 109, 116, 173, 75, 70, 117, 57, 129, 171, 198, 194, 154, 177, 82, 103, 30, 174, 85, 191, 116, 30, 164, 155, 38, 38, 49, 84, 34, 111, 159}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear():

Expected [106, 14, 71, 71, 166, 172, 128, 128, 52, 113, 58, 184, 70, 73, 37, 83, 71, 46, 133, 100, 37, 186, 199, 69, 79, 71, 70, 13, 155, 90, 60, 82, 180, 125, 108, 160, 74, 93, 72, 152, 106, 11, 174, 164, 168, 6, 9, 41, 58, 65, 141, 22, 103, 49, 114, 197, 175, 131, 109, 135, 124, 19, 76, 109, 130, 15, 120, 12, 11, 77, 88, 56, 127, 162, 67, 133, 162, 22, 94, 122, 53, 132, 167, 111, 138, 61, 169, 64, 98, 159, 58, 147, 137, 50, 193, 190, 173, 28, 35, 108, 138, 110, 184, 82, 114, 199, 137, 156, 155, 167, 165, 134, 193, 22, 173, 176, 46, 61, 196, 137, 151, 69, 67, 87, 161, 72, 60, 70, 67, 109, 149, 16, 38, 127, 15, 12, 107, 48, 184, 185, 43, 178, 14, 188, 61, 79, 189, 144, 27, 41, 114, 182, 118, 76, 89, 126, 124, 195, 180, 133, 118, 96, 61, 95, 127, 40, 62, 102, 130, 174, 47, 131, 187, 103, 88, 109, 153, 110, 184, 72, 178, 41, 93, 112, 24, 156, 180, 150, 114, 172, 43, 170, 46, 166, 109, 193, 13, 17, 190, 153, 80, 106, 199, 163, 106, 39, 85, 56, 174, 189, 61, 72, 154, 149, 59, 110, 139, 189, 99, 40, 84, 180, 23, 13, 9, 192, 163, 88, 1, 3, 149, 132, 36, 34, 120, 40, 48, 32, 91, 166, 42, 155, 30, 111, 140, 6, 189, 169, 50, 15, 144, 67, 145, 169, 49, 135, 49, 76, 0, 105, 90, 60, 75, 88, 150, 88, 122, 11, 158, 12, 43, 182, 152, 112, 65, 149, 14, 194, 146, 120, 114, 178, 177, 159, 105, 45, 169, 152, 150, 60, 99, 39, 73, 101, 162, 173, 127, 122, 157, 116, 139, 57, 101, 121, 45, 133, 151, 171, 186, 186, 116, 4, 173, 118, 103, 70, 133, 158, 119, 47, 142, 111, 110, 96, 68, 118, 153, 178, 174, 130, 176, 186, 23, 193, 40, 175, 107, 184, 168, 185, 56, 167, 169, 68, 42, 75, 26, 174, 92, 46, 18, 85, 131, 164, 15, 116, 197, 88, 143, 8, 115, 199, 173, 142, 139, 162, 62, 7, 33, 2, 4, 54, 22, 135, 194, 34, 17, 90, 154, 71, 6, 156, 76, 66, 172, 157, 39, 92, 68, 169, 117, 166, 86, 153, 106, 63, 142, 190, 149, 58, 31, 19, 114, 35, 110, 108, 103, 27, 139, 97, 166, 186, 164, 55, 19, 133,

[106, 14, 71, 71, 166, 172, 128, 128, 52, 113, 58, 184, 70, 73, 37, 83, 71, 46, 133, 100, 37, 186, 199, 69, 79, 71, 70, 13, 155, 90, 60, 82, 180, 125, 108, 160, 74, 93, 72, 152, 106, 11, 174, 164, 168, 6, 9, 41, 58, 65, 141, 22, 103, 49, 114, 197, 175, 131, 109, 135, 124, 19, 76, 109, 130, 15, 120, 12, 11, 77, 88, 56, 127, 162, 67, 133, 162, 22, 94, 122, 53, 132, 167, 111, 138, 61, 169, 64, 98, 159, 58, 147, 137, 50, 193, 190, 173, 28, 35, 108, 138, 110, 184, 82, 114, 199, 137, 156, 155, 167, 165, 134, 193, 22, 173, 176, 46, 61, 196, 137, 151, 69, 67, 87, 161, 72, 60, 70, 67, 109, 149, 16, 38, 127, 15, 12, 107, 48, 184, 185, 43, 178, 14, 188, 61, 79, 189, 144, 27, 41, 114, 182, 118, 76, 89, 126, 124, 195, 180, 133, 118, 96, 61, 95, 127, 40, 62, 102, 130, 174, 47, 131, 187, 103, 88, 109, 153, 110, 184, 72, 178, 41, 93, 112, 24, 156, 180, 150, 114, 172, 43, 170, 46, 166, 109, 193, 13, 17, 190, 153, 80, 106, 199, 163, 106, 39, 85, 56, 174, 189, 61, 72, 154, 149, 59, 110, 139, 189, 99, 40, 84, 180, 23, 13, 9, 192, 163, 88, 1, 3, 149, 132, 36, 34, 120, 40, 48, 32, 91, 166, 42, 155, 30, 111, 140, 6, 189, 169, 50, 15, 144, 67, 145, 169, 49, 135, 49, 76, 0, 105, 90, 60, 75, 88, 150, 88, 122, 11, 158, 12, 43, 182, 152, 112, 65, 149, 14, 194, 146, 120, 114, 178, 177, 159, 105, 45, 169, 152, 150, 60, 99, 39, 73, 101, 162, 173, 127, 122, 157, 116, 139, 57, 101, 121, 45, 133, 151, 171, 186, 186, 116, 4, 173, 118, 103, 70, 133, 158, 119, 47, 142, 111, 110, 96, 68, 118, 153, 178, 174, 130, 176, 186, 23, 193, 40, 175, 107, 184, 168, 185, 56, 167, 169, 68, 42, 75, 26, 174, 92, 46, 18, 85, 131, 164, 15, 116, 197, 88, 143, 8, 115, 199, 173, 142, 139, 162, 62, 7, 33, 2, 4, 54, 22, 135, 194, 34, 17, 90, 154, 71, 6, 156, 76, 66, 172, 157, 39, 92, 68, 169, 117, 166, 86, 153, 106, 63, 142, 190, 149, 58, 31, 19, 114, 35, 110, 108, 103, 27, 139, 97, 166, 186, 164, 55, 19, 133,

28, 40, 72, 116, 192, 17, 159, 169, 143, 167, 77, 25, 128, 102, 140, 120, 140, 71, 56, 76, 16, 13, 144, 91, 166, 2, 74, 164, 153, 71, 37, 187, 104, 172, 122, 9, 109, 116, 173, 75, 70, 117, 57, 129, 171, 198, 194, 154, 177, 82, 103, 30, 174, 85, 191, 116, 30, 164, 115, 38, 38, 49, 84, 34, 111, 159] [159, 111, 34, 84, 49, 38, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 120, 184, 86, 104, 143, 21, 24, 184, 86, 104, 143, 21, 54, 74, 24, 184, 86, 104, 143, 21, 54, 74, 184, 185, 191, 199, 191, 199, 116, 72, 40, 28, 172, 22, 39, 70, 116, 184, 86, 104, 143, 32, 5, 184, 86, 104, 143, 184, 184, 133, 19, 184, 194, 135, 194, 133, 199, 143, 134, 194, 135, 194, 134, 194, 135, 194, 194, 194, 194, 194, 194, 194, 194	43, 104, 86, 39, 22, 172, 16, 192, 17, 167, 77, 25, 120, 140,
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71, 37, 187, 104, 172, 122, 9, 109, 116, 173, 75, 70, 117, 57, 129, 171, 198, 117, 57, 129, 174, 182, 193, 30, 194, 154, 177, 82, 103, 30, 194, 154, 171, 159] [159, 111, 34, 84, 49, 38, [159, 111, 38, 185, 164, 38, 194, 198, 171, 129, 184, 194, 198, 171, 129, 184, 194, 198, 171, 129, 184, 184, 184, 184, 185, 184, 185, 184, 186, 194, 183, 185, 184, 186, 194, 183, 195, 171, 194, 186, 194, 184, 184, 184, 184, 184, 184, 184, 18	A 16A 153
9, 109, 116, 173, 75, 70, 117, 57, 129, 171, 198, 1194, 154, 177, 82, 103, 30, 174, 85, 191, 116, 30, 164, 155, 38, 38, 49, 84, 34, 111, 159] [159, 111, 34, 84, 49, 38, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 167, 143, 169, 128, 172, 22, 39, 70, 116, 184, 86, 104, 143, 32, 5, 179, 35, 87, 8, 38, 153, 194, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 116, 35, 164, 194, 194, 137, 189, 116, 35, 164, 194, 194, 137, 189, 116, 35, 164, 194, 194, 137, 189, 116, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 156, 6, 71, 154, 99, 17, 34, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 197, 116, 15, 164, 131, 85, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 169, 109, 116, 117, 57, 129, 117, 57, 129, 104, 124, 485, 191, 111, 159] 117, 57, 129, 111, 133, 194, 115, 194, 135, 191, 111, 159] 1155, 38, 38, 111, 115, 116, 152, 164, 131, 85, 116, 184, 107, 175, 40, 169, 104, 107, 107, 108, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 34, 49, 38, 111, 159] 1159, 111, 34, 44, 49, 38, 111, 159] 1159, 111, 34, 44, 49, 31, 111, 159] 1159, 111, 34, 44, 49, 31, 111, 159] 1159, 111, 34, 44, 49, 34, 111, 159	
194, 154, 177, 82, 103, 30, 174, 85, 191, 116, 30, 164, 175, 38, 38, 49, 84, 34, 111, 159] [159, 111, 34, 84, 49, 38, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 140, 162, 179, 35, 87, 8, 38, 153, 194, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 109, 110, 35, 114, 19, 31, 58, 179, 316, 31, 71, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 71, 154, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 197, 116, 15, 164, 131, 85, 184, 469, 21, 742, 66, 169, 168, 184, 107, 175, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 168, 184, 107, 1075, 40, 16	
174, 85, 191, 116, 30, 164, 155, 38, 38, 49, 84, 34, 111, 159] [159, 111, 34, 84, 49, 38, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 28, 172, 22, 39, 70, 116, 184, 86, 104, 143, 32, 5, 179, 35, 87, 8, 38, 153, 194, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 149, 190, 142, 63, 106, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 156, 6, 71, 174, 69, 76, 156, 6, 71, 174, 69, 77, 174, 175, 40, 177, 184, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 197, 116, 15, 164, 131, 85, 184, 69, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 168, 184, 107, 175, 40, 168, 184, 107, 177, 175, 177, 178, 178, 178, 178, 178, 178, 178	171, 198,
155, 38, 38, 49, 84, 34, 111, 159] [159, 111, 34, 84, 49, 38, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 159, 17, 192, 116, 72, 40, 28, 172, 22, 39, 70, 116, 184, 86, 104, 143, 32, 5, 179, 35, 87, 8, 38, 153, 194, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 149, 190, 142, 63, 106, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 156, 6, 71, 154, 90, 17, 34, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 197, 116, 15, 164, 131, 85, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40,	, 82, 103, 30,
111, 159] [159, 111, 34, 84, 49, 38, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 85, 174, 30, 199, 91, 122, 172, 104, 187, 109, 91, 122, 37, 71, 153, 166, 91, 144, 13, 16, 76, 166, 91, 144, 13, 16, 76, 156, 71, 140, 120, 140, 102, 154, 194, 198, 172, 22, 39, 70, 116, 28, 172, 22, 39, 70, 116, 28, 172, 22, 39, 70, 116, 28, 172, 22, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 194, 133, 19, 55, 164, 186, 194, 133, 19, 55, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 155, 164, 186, 194, 133, 19, 156, 6, 71, 154, 90, 17, 34, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 144, 185, 184, 69, 24, 74, 26, 75, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184,	116, 30, 164,
[159, 111, 34, 84, 49, 38, 38, 155, 164, 38, 155, 164, 30, 116, 191, 85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 77, 117, 70, 109, 9, 122, 172, 104, 187, 109, 9, 122, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 74, 2, 37, 71, 153, 164, 109, 9, 122, 37, 71, 159, 17, 192, 116, 72, 40, 128, 25, 77, 159, 17, 192, 116, 72, 40, 128, 172, 22, 184, 86, 104, 143, 32, 5, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 190, 142, 63, 106, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 156, 6, 71, 154, 90, 17, 34, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 33, 7, 62, 161, 131, 88, 107, 116, 15, 164, 131, 85, 197, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 168, 184, 107, 175, 40, 168	49, 84, 34,
38, 155, 164, 30, 116, 191, 85, 174, 30, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 167, 143, 169, 128, 172, 22, 39, 70, 116, 184, 86, 104, 143, 32, 5, 184, 86, 104, 143, 32, 5, 194, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 143, 88, 149, 190, 142, 63, 106, 171, 169, 68, 92, 39, 157, 172, 66, 76, 156, 6, 71, 154, 90, 17, 34, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 197, 116, 15, 164, 131, 85, 166, 177, 169, 168, 184, 107, 175, 40, 168, 184, 107, 107, 107, 107, 107, 107, 107, 107	. 84. 49. 38.
85, 174, 30, 103, 82, 177, 154, 194, 198, 171, 129, 57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 28, 172, 22, 39, 70, 116, 184, 86, 104, 143, 32, 5, 194, 133, 19, 55, 164, 186, 166, 97, 139, 170, 183, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 114, 19, 31, 58, 123, 33, 7, 62, 163, 184, 86, 124, 137, 192, 115, 164, 131, 85, 179, 115, 18, 46, 92, 173, 199, 115, 8, 143, 88, 179, 116, 15, 164, 131, 85, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 168, 184, 107, 175, 40, 168, 184, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107, 1154, 107,	30, 116, 191,
57, 117, 70, 75, 173, 116, 109, 9, 122, 172, 104, 187, 166, 91, 144, 13, 16, 76, 166, 91, 144, 13, 16, 76, 166, 91, 144, 13, 16, 76, 166, 91, 144, 13, 169, 128, 25, 77, 167, 149, 169, 17, 192, 116, 72, 40, 28, 172, 22, 39, 70, 116, 28, 172, 22, 184, 86, 104, 143, 32, 5, 179, 35, 87, 8, 38, 153, 194, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 190, 142, 63, 106, 149, 190, 142, 63, 106, 149, 190, 142, 63, 106, 149, 190, 142, 63, 106, 149, 190, 142, 63, 106, 149, 190, 143, 194, 135, 22, 54, 4, 2, 33, 7, 62, 162, 139, 142, 33, 7, 62, 166, 67, 7, 16, 15, 164, 131, 85, 184, 169, 168, 184, 107, 175, 40,	103, 82, 177,
109, 9, 122, 172, 104, 187, 37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 159, 17, 192, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 104, 133, 19, 55, 164, 186, 110, 35, 114, 19, 190, 142, 63, 106, 113, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 156, 6, 71, 154, 90, 17, 156, 6, 71, 158, 143, 189, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 164, 131, 85, 18, 46, 92, 174, 26, 75, 18, 46, 92,	, 171, 129,
37, 71, 153, 164, 74, 2, 166, 91, 144, 13, 16, 76, 166, 91, 144, 13, 16, 76, 166, 91, 144, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 159, 17, 192, 184, 86, 104, 143, 32, 5, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 123, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 156, 183, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 18, 46, 92, 174, 26, 75, 126, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 107, 107, 1	75, 173, 116,
166, 91, 144, 13, 16, 76, 56, 71, 140, 120, 140, 102, 128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 128, 172, 22, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 194, 133, 19, 55, 164, 186, 106, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 149, 190, 142, 63, 106, 149, 190, 142, 63, 106, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 156, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 6, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 156, 71, 1	172, 104, 187,
56, 71, 140, 120, 140, 102, 56, 71, 140, 128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 28, 172, 22, 39, 70, 116, 28, 172, 22, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 194, 133, 19, 55, 164, 186, 194, 133, 19, 166, 97, 139, 27, 103, 108, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 190, 142, 63, 106, 149, 190, 142, 63, 106, 153, 86, 166, 117, 169, 68, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 34, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 107, 107, 107, 107, 107, 107, 107	
128, 25, 77, 167, 143, 169, 128, 25, 77, 159, 17, 192, 116, 72, 40, 159, 17, 192, 28, 172, 22, 39, 70, 116, 28, 172, 22, 184, 86, 104, 143, 32, 5, 184, 86, 104, 179, 35, 87, 8, 38, 153, 179, 35, 87, 194, 133, 19, 55, 164, 186, 194, 133, 19, 166, 97, 139, 27, 103, 108, 166, 97, 139, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 190, 142, 63, 106, 149, 190, 142, 63, 106, 149, 190, 142, 63, 166, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 156, 6, 71, 154, 90, 17, 156, 6, 71, 156, 6, 71, 157, 156, 185, 18, 184, 183, 185, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 174, 26, 75, 18, 46, 92, 168, 184, 107, 175, 40, 16	120, 140, 102,
159, 17, 192, 116, 72, 40, 28, 172, 22, 184, 86, 104, 143, 32, 5, 184, 86, 104, 133, 19, 55, 164, 186, 194, 133, 19, 106, 97, 139, 27, 103, 108, 166, 97, 139, 110, 35, 114, 19, 31, 58, 110, 35, 114, 19, 190, 142, 63, 106, 149, 190, 142, 63, 106, 153, 86, 166, 117, 169, 68, 153, 86, 166, 92, 39, 157, 172, 66, 76, 92, 39, 157, 172, 66, 76, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 190, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 117, 116, 15, 164, 131, 85, 118, 46, 92, 174, 26, 75, 126, 68, 169, 168, 184, 107, 175, 40, 168, 184, 105, 168,	167, 143, 169,
184, 86, 104, 143, 32, 5, 184, 86, 104, 179, 35, 87, 8, 38, 153, 179, 35, 87, 194, 133, 19, 55, 164, 186, 194, 133, 19, 166, 97, 139, 27, 103, 108, 166, 97, 139, 110, 35, 114, 19, 31, 58, 110, 35, 114, 149, 190, 142, 63, 106, 149, 190, 144, 153, 86, 166, 117, 169, 68, 153, 86, 166, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 134, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 342, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 107, 107, 107, 107, 107, 107, 107	116, 72, 40,
179, 35, 87, 8, 38, 153, 179, 35, 87, 194, 133, 19, 55, 164, 186, 194, 133, 19, 166, 97, 139, 27, 103, 108, 166, 97, 139, 110, 35, 114, 19, 31, 58, 110, 35, 114, 149, 190, 142, 63, 106, 149, 190, 144, 153, 86, 166, 117, 169, 68, 153, 86, 166, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 168, 184, 107, 175, 168, 184, 107, 175, 168, 184, 107, 175, 184, 107, 175, 184, 107, 175, 184, 107, 175, 184, 184, 107, 175, 184, 184, 107, 175, 184, 184, 107, 175, 184, 184, 187, 185, 184, 187, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 185, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 187, 184, 18	
194, 133, 19, 55, 164, 186, 194, 133, 19, 166, 97, 139, 27, 103, 108, 166, 97, 139, 110, 35, 114, 19, 31, 58, 110, 35, 114, 149, 190, 142, 63, 106, 149, 190, 144, 153, 86, 166, 117, 169, 68, 153, 86, 166, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 168, 184, 107, 175, 40, 168, 184, 107, 108, 108, 108, 108, 108, 108, 108, 108	
166, 97, 139, 27, 103, 108, 166, 97, 139, 110, 35, 114, 19, 31, 58, 110, 35, 114, 149, 190, 142, 63, 106, 149, 190, 143, 153, 86, 166, 117, 169, 68, 153, 86, 166, 92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 134, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 107, 107, 108, 108, 108, 108, 108, 108, 108, 108	
110, 35, 114, 19, 31, 58, 110, 35, 114, 149, 190, 142, 63, 106, 149, 190, 142, 153, 86, 166, 117, 169, 68, 153, 86, 166, 166, 6, 71, 154, 90, 17, 156, 6, 71, 154, 164, 185, 185, 185, 185, 185, 185, 185, 185	
153, 86, 166, 117, 169, 68, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 90, 17, 156, 6, 71, 154, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 173, 199, 115, 8, 143, 88, 173, 199, 115, 197, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 168, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 184, 167, 175, 184, 185, 184, 107, 175, 185, 185, 185, 185, 185, 185, 185, 18	
92, 39, 157, 172, 66, 76, 92, 39, 157, 156, 6, 71, 154, 90, 17, 156, 6, 71, 153, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 161, 173, 199, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 175, 168, 184, 107, 175, 184, 185, 18	, 63, 106,
156, 6, 71, 154, 90, 17, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 115, 8, 143, 88, 173, 199, 115, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 42, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 18, 46, 92, 168, 184, 107, 175, 40, 168, 184, 107, 185, 184, 107, 185, 184, 185, 184, 185, 184, 185, 184, 185, 184, 185, 185, 184,	117, 169, 68,
34, 194, 135, 22, 54, 4, 2, 34, 194, 135, 33, 7, 62, 162, 139, 142, 33, 7, 62, 162, 139, 142, 173, 199, 115, 8, 143, 88, 173, 199, 115, 197, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 342, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 175, 40, 168, 184, 107, 185, 184, 185	
33, 7, 62, 162, 139, 142, 33, 7, 62, 16 173, 199, 115, 8, 143, 88, 173, 199, 115 197, 116, 15, 164, 131, 85, 197, 116, 15 18, 46, 92, 174, 26, 75, 18, 46, 92, 3 42, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107	
197, 116, 15, 164, 131, 85, 197, 116, 15, 18, 46, 92, 174, 26, 75, 18, 46, 92, 142, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107	
18, 46, 92, 174, 26, 75, 18, 46, 92, 1 42, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107	, 8, 143, 88,
42, 68, 169, 167, 56, 185, 42, 68, 169, 168, 184, 107, 175, 40, 168, 184, 107	164, 131, 85,
168, 184, 107, 175, 40, 168, 184, 107	
174, 178, 153, 118, 68, 96, 174, 178, 153	, 118, 68, 96,
110, 111, 142, 47, 119, 110, 111, 142	, 47, 119,
158, 133, 70, 103, 118, 158, 133, 70,	
	186, 186, 171,
151, 133, 45, 121, 101, 57, 151, 133, 45, 139, 116, 157, 122, 127, 139, 116, 157	121, 101, 57, 1, 122, 127,
	, 73, 39, 99,
	169, 45, 105,
159, 177, 178, 114, 120, 159, 177, 178	, 114, 120,
	149, 65, 112,
	12, 158, 11,
122, 88, 150, 88, 75, 60, 122, 88, 150, 90, 105, 0, 76, 49, 135, 90, 105, 0, 76	
	67, 144, 15,
	6, 140, 111,
30, 155, 42, 166, 91, 32, 30, 155, 42,	166, 91, 32,
48, 40, 120, 34, 36, 132, 48, 40, 120,	
	, 163, 192, 9,
	, 163, 192, 9, 84, 40, 99,
	, 163, 192, 9, 84, 40, 99, , 59, 149,
	, 163, 192, 9, 84, 40, 99,
	, 163, 192, 9, 84, 40, 99, , 59, 149, 189, 174, 56,
114, 150, 180, 156, 24, 114, 150, 186	7, 163, 192, 9, 84, 40, 99, 59, 149, 189, 174, 56, 163, 199, 106, 17, 13, 193, 170, 43, 172,
112, 93, 41, 178, 72, 184,	7, 163, 192, 9, 84, 40, 99, 1, 59, 149, 189, 174, 56, 163, 199, 106, 17, 13, 193, 170, 43, 172, 1, 156, 24,

FIVI	Singly Linked List. Aem iại iam iam thư	DIV-LING
Test	Expected	Got
	187, 131, 47, 174, 130,	187, 131, 47, 174, 130,
	102, 62, 40, 127, 95, 61,	102, 62, 40, 127, 95, 61,
	96, 118, 133, 180, 195,	96, 118, 133, 180, 195,
	124, 126, 89, 76, 118, 182,	124, 126, 89, 76, 118, 182,
	114, 41, 27, 144, 189, 79,	114, 41, 27, 144, 189, 79,
	61, 188, 14, 178, 43, 185,	61, 188, 14, 178, 43, 185,
	184, 48, 107, 12, 15, 127,	184, 48, 107, 12, 15, 127,
	38, 16, 149, 109, 67, 70,	38, 16, 149, 109, 67, 70,
	60, 72, 161, 87, 67, 69,	60, 72, 161, 87, 67, 69,
	151, 137, 196, 61, 46, 176,	151, 137, 196, 61, 46, 176,
	173, 22, 193, 134, 165,	173, 22, 193, 134, 165,
	167, 155, 156, 137, 199,	167, 155, 156, 137, 199,
	114, 82, 184, 110, 138,	114, 82, 184, 110, 138,
	108, 35, 28, 173, 190, 193,	108, 35, 28, 173, 190, 193,
	50, 137, 147, 58, 159, 98,	50, 137, 147, 58, 159, 98,
	64, 169, 61, 138, 111, 167,	64, 169, 61, 138, 111, 167,
	132, 53, 122, 94, 22, 162,	132, 53, 122, 94, 22, 162,
	133, 67, 162, 127, 56, 88,	133, 67, 162, 127, 56, 88,
	77, 11, 12, 120, 15, 130,	77, 11, 12, 120, 15, 130,
	109, 76, 19, 124, 135, 109,	109, 76, 19, 124, 135, 109,
	131, 175, 197, 114, 49,	131, 175, 197, 114, 49,
	103, 22, 141, 65, 58, 41,	103, 22, 141, 65, 58, 41,
	9, 6, 168, 164, 174, 11,	9, 6, 168, 164, 174, 11,
	106, 152, 72, 93, 74, 160,	106, 152, 72, 93, 74, 160,
	108, 125, 180, 82, 60, 90,	108, 125, 180, 82, 60, 90,
	155, 13, 70, 71, 79, 69,	155, 13, 70, 71, 79, 69,
	199, 186, 37, 100, 133, 46,	199, 186, 37, 100, 133, 46,
	71, 83, 37, 73, 70, 184,	71, 83, 37, 73, 70, 184,
	58, 113, 52, 128, 128, 172,	58, 113, 52, 128, 128, 172,
	166, 71, 71, 14, 106]	166, 71, 71, 14, 106]

int arr[] = {6, 82, 125, 139, 190, 149, 33, 100, 40, 79, 99, 85, 125, 87, 116, 160, 18, 184, 147, 157, 52, 66, 166, 43, 59, 58, 188, 174, 84, 39, 185, 18, 60, 78, 161, 111, 129, 25, 56, 38, 59, 139, 122, 2, 139, 15, 126, 122, 19, 42, 152, 78, 119, 94, 120, 8, 18, 128, 157, 22, 4, 132, 29, 61, 114, 95, 161, 128, 86, 102, 101, 104, 73, 85, 30, 94, 126, 98, 183, 103, 121, 156, 189, 96, 96, 14, 65, 147, 121, 0, 111, 40, 52, 39, 53, 183, 66, 108, 53, 164, 6, 11, 30, 37, 107, 109, 104, 80, 118, 32, 63, 32, 197, 125, 50, 138, 64, 139, 188, 139, 23, 106, 107, 53, 117, 90, 135, 9, 3, 109, 53, 198, 40, 50, 44, 91, 7, 187, 176, 89, 26, 42, 46, 61, 150, 135, 7, 37, 182, 85, 72, 121, 69, 198, 88, 92, 166, 108, 124, 186, 142, 106, 160, 116, 188, 50, 79, 50, 87, 144, 133, 153, 138, 86, 115, 165, 12, 185, 123, 0, 123, 197, 4, 20, 169, 141, 16, 61, 111, 53, 172, 19, 194, 155, 0, 79, 59, 3, 175, 155, 19, 186, 113, 183, 22, 22, 55, 145, 7, 188, 47, 140, 133, 17, 10, 189, 93, 181, 73, 106, 72, 13, 31, 35, 199, 128, 43, 54, 75, 5, 108, 102, 170, 35, 42, 91, 55, 72, 91, 56, 24, 174, 11, 81, 174, 59, 16, 3, 73, 15, 29, 145, 186, 44, 92, 156, 125, 81, 186, 18, 103, 16, 189, 10, 4, 161, 65, 103, 196, 126, 180, 147, 78, 56, 71, 182, 118, 97, 86, 127, 35, 124, 138, 138, 196, 2, 52, 187, 101, 119, 108, 18, 52, 60, 36, 160, 177, 85, 46, 112, 77, 70, 85, 89, 178, 162, 35, 147, 147, 173, 190, 121, 133, 67, 40, 86, 63, 7, 72, 66, 86, 24, 179, 79, 180, 129, 199, 151, 74, 176, 105, 161, 147, 26, 173, 179, 162, 69, 62, 122, 191, 93, 63, 96, 119, 155, 65, 197, 18, 11, 53, 49, 64, 133, 85, 64, 86, 79, 135, 80, 109, 153, 178, 55, 61, 177, 43, 169, 64, 103, 65, 120, 89, 131, 144, 124, 167, 46, 27, 118, 77, 135, 198, 183, 84, 31, 131, 110, 82, 166, 99, 26, 125, 47, 56, 85, 155, 10, 0, 2, 180, 74, 180, 136, 26, 158, 178, 134, 119, 83, 128, 138, 64, 25, 82, 109, 185, 148, 13, 129, 25, 79, 157, 198, 23, 76, 52, 41, 77, 7, 188, 46, 28, 36, 127, 32, 129, 46, 45, 46, 6, 121, 86, 88, 148, 34, 112, 122, 71, 134, 43, 40, 18, 168, 171, 196, 101, 103, 94, 155, 20, 183, 151, 126, 130, 31, 10, 16, 142, 163, 193, 36, 93, 2, 110, 105, 144, 43, 169, 175, 143, 187, 21, 36, 174, 123, 110, 139, 86, 144, 134, 37, 87, 122, 0, 90, 30, 113, 188, 1, 114, 77, 141, 70, 35, 45, 127, 164, 44, 66, 69, 12, 24, 85, 66, 84, 115, 126, 142, 107, 99, 127, 75, 164, 191, 168, 57, 146, 166, 20, 111, 107, 43, 124, 178, 175, 16, 122, 83, 186, 153, 17, 164, 136, 170, 59, 83, 57, 179, 195, 11, 38, 155, 196, 7, 162, 27, 169, 72, 20, 44, 39, 41, 29, 140, 104, 33, 165, 116, 185, 112, 195, 118, 38, 142, 4, 30, 117, 32, 138, 13, 144, 93, 89, 30, 47, 40, 159, 99, 69, 38, 3, 23, 138, 131, 167, 154, 81, 64, 144, 144, 170, 167, 190, 35, 179, 162, 31, 146, 187, 25, 80, 10, 159, 67, 15, 196, 88, 103, 91, 55, 45, 115, 5, 64, 101, 21, 67, 119, 87, 103, 178, 3, 94, 152, 179, 41, 79, 121, 26, 193, 45, 62, 83, 73, 183, 150, 22, 22, 79, 12, 101, 24, 7, 31, 26, 86, 128, 134, 174, 10, 51, 88, 152, 22, 123, 163, 107, 118, 82, 147, 84, 168, 147, 158, 146, 82, 64, 30, 142, 67, 61, 71, 173, 77, 196, 121, 195, 1, 35, 183, 115, 115, 3, 121, 45, 191, 106, 144, 166, 29, 27, 144, 62, 137, 69, 155, 182, 134, 113, 195, 0, 188, 56, 199, 100, 166, 53, 186, 128, 153, 86, 1, 152, 67, 104, 44, 190, 168, 107, 126, 180, 179, 124, 16, 135, 19, 131, 107, 142, 132, 108, 173, 76, 135, 1, 141, 114, 52, 152, 34, 96, 47, 129, 170, 125, 41, 115, 167, 14, 1, 39, 62, 187, 154, 44, 3, 8,

Expected [6, 82, 125, 139, 190, 149, 33, 100, 40, 79, 99, 85, 125, 87, 116, 160, 18, 184, 147, 157, 52, 66, 166, 43, 59, 58, 188, 174, 84, 39, 185, 18, 60, 78, 161, 111, 129, 25, 56, 38, 59, 139, 122, 2, 139, 15, 126, 122, 19, 42, 152, 78, 119, 94, 120, 8, 18, 128, 157, 22, 4, 132, 29, 61, 114, 95, 161, 128, 86, 102, 101, 104, 73, 85, 30, 94, 126, 98, 183, 103, 121, 156, 189, 96, 96, 14, 65, 147, 121, 0, 111, 40, 52, 39, 53, 183, 66, 108, 53, 164, 6, 11, 30, 37, 107, 109, 104, 80, 118, 32, 63, 32, 197, 125, 50, 138, 64, 139, 188, 139, 23, 106, 107, 53, 117, 90, 135, 9, 3, 109, 53, 198, 40, 50, 44, 91, 7, 187, 176, 89, 26, 42, 46, 61, 150, 135, 7, 37, 182, 85, 72, 121, 69, 198, 88, 92, 166, 108, 124, 186, 142, 106, 160, 116, 188, 50, 79, 50, 87, 144, 133, 153, 138, 86, 115, 165, 12, 185, 123, 0, 123, 197, 4, 20, 169, 141, 16, 61, 111, 53, 172, 19, 194, 155, 0, 79, 59, 3, 175, 155, 19, 186, 113, 183, 22, 22, 55, 145, 7, 188, 47, 140, 133, 17, 10, 189, 93, 181, 73, 106, 72, 13, 31, 35, 199, 128, 43, 54, 75, 5, 108, 102, 170, 35, 42, 91, 55, 72, 91, 56, 24, 174, 11, 81, 174, 59, 16, 3, 73, 15, 29, 145, 186, 44, 92, 156, 125, 81, 186, 18, 103, 16, 189, 10, 4, 161, 65, 103, 196, 126, 180, 147, 78, 56, 71, 182, 118, 97, 86, 127, 35, 124, 138, 138, 196, 2, 52, 187, 101, 119, 108, 18, 52, 60, 36, 160, 177, 85, 46, 112, 77, 70, 85, 89, 178, 162, 35, 147, 147, 173, 190, 121, 133, 67, 40, 86, 63, 7, 72, 66, 86, 24, 179, 79, 180, 129, 199, 151, 74, 176, 105, 161, 147, 26, 173, 179, 162, 69, 62, 122, 191, 93, 63, 96, 119, 155, 65, 197, 18, 11, 53, 49, 64, 133, 85, 64, 86, 79, 135, 80, 109, 153, 178, 55, 61, 177, 43, 169, 64, 103, 65, 120, 89, 131, 144, 124, 167, 46, 27, 118, 77, 135, 198, 183, 84, 31, 131, 110, 82, 166, 99, 26, 125, 47, 56, 85, 155, 10, 0, 2, 180, 74, 180, 136, 26, 158, 178, 134, 119, 83, 128, 138, 64, 25, 82, 109, 185, 148, 13, 129, 25, 79,

[6, 82, 125, 139, 190, 149, 33, 100, 40, 79, 99, 85, 125, 87, 116, 160, 18, 184, 147, 157, 52, 66, 166, 43, 59, 58, 188, 174, 84, 39, 185, 18, 60, 78, 161, 111, 129, 25, 56, 38, 59, 139, 122, 2, 139, 15, 126, 122, 19, 42, 152, 78, 119, 94, 120, 8, 18, 128, 157, 22, 4, 132, 29, 61, 114, 95, 161, 128, 86, 102, 101, 104, 73, 85, 30, 94, 126, 98, 183, 103, 121, 156, 189, 96, 96, 14, 65, 147, 121, 0, 111, 40, 52, 39, 53, 183, 66, 108, 53, 164, 6, 11, 30, 37, 107, 109, 104, 80, 118, 32, 63, 32, 197, 125, 50, 138, 64, 139, 188, 139, 23, 106, 107, 53, 117, 90, 135, 9, 3, 109, 53, 198, 40, 50, 44, 91, 7, 187, 176, 89, 26, 42, 46, 61, 150, 135, 7, 37, 182, 85, 72, 121, 69, 198, 88, 92, 166, 108, 124, 186, 142, 106, 160, 116, 188, 50, 79, 50, 87, 144, 133, 153, 138, 86, 115, 165, 12, 185, 123, 0, 123, 197, 4, 20, 169, 141, 16, 61, 111, 53, 172, 19, 194, 155, 0, 79, 59, 3, 175, 155, 19, 186, 113, 183, 22, 22, 55, 145, 7, 188, 47, 140, 133, 17, 10, 189, 93, 181, 73, 106, 72, 13, 31, 35, 199, 128, 43, 54, 75, 5, 108, 102, 170, 35, 42, 91, 55, 72, 91, 56, 24, 174, 11, 81, 174, 59, 16, 3, 73, 15, 29, 145, 186, 44, 92, 156, 125, 81, 186, 18, 103, 16, 189, 10, 4, 161, 65, 103, 196, 126, 180, 147, 78, 56, 71, 182, 118, 97, 86, 127, 35, 124, 138, 138, 196, 2, 52, 187, 101, 119, 108, 18, 52, 60, 36, 160, 177, 85, 46, 112, 77, 70, 85, 89, 178, 162, 35, 147, 147, 173, 190, 121, 133, 67, 40, 86, 63, 7, 72, 66, 86, 24, 179, 79, 180, 129, 199, 151, 74, 176, 105, 161, 147, 26, 173, 179, 162, 69, 62, 122, 191, 93, 63, 96, 119, 155, 65, 197, 18, 11, 53, 49, 64, 133, 85, 64, 86, 79, 135, 80, 109, 153, 178, 55, 61, 177, 43, 169, 64, 103, 65, 120, 89, 131, 144, 124, 167, 46, 27, 118, 77, 135, 198, 183, 84, 31, 131, 110, 82, 166, 99, 26, 125, 47, 56, 85, 155, 10, 0, 2, 180, 74, 180, 136, 26, 158, 178, 134, 119, 83, 128, 138, 64, 25, 82, 109, 185, 148, 13, 129, 25, 79,

167, 5, 95, 83, 124, 192, 123, 105, 22, 121, 26, 86, 174, 31, 73, 100, 146, 92, 194, 11, 61, 194, 139, 67, 97, 132, 24, 198, 113, 59, 16, 41, 27, 11, 14, 172, 6, 142, 46, 184, 89, 150, 100, 65, 116, 192, 183, 60, 179, 119, 131, 66, 160, 167, 175, 53, 95, 196, 4, 27, 33, 106, 136, 49, 105, 54, 50, 82, 51, 196, 78, 64, 70, 42, 131, 170, 111, 109, 44, 86, 32, 107, 28, 113, 81, 57, 165, 173, 62, 126, 178, 34, 64, 87, 179, 41, 73, 148, 105, 60, 42, 195, 91, 122, 31, 164, 9, 130, 30, 149, 143, 85, 123, 62, 76, 121, 16, 119, 163, 147, 123, 129, 113, 117, 136, 3, 33, 80, 25, 30, 4, 27, 107, 11, 125, 157, 195, 131, 140, 80, 161, 111, 33, 15, 164, 178, 164, 65, 166, 43, 130, 86, 104, 31, 91, 81, 193, 190, 185, 191, 155, 149, 91, 79, 87, 116, 59, 194, 115, 113, 85, 197, 33, 165, 74, 61, 57, 93, 92, 26, 9, 116, 162, 127, 21, 39, 118, 73, 18, 113, 165, 117, 183, 136, 94, 183, 101, 15, 143, 49, 174, 21, 92, 129, 21, 142, 194, 30, 140, 65, 83, 28, 36, 58, 27, 29, 184, 41, 82, 178, 43, 170, 67, 163, 155, 38, 197, 116, 78, 106, 191, 57}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear();

Expected 157, 198, 23, 76, 52, 41, 77, 7, 188, 46, 28, 36, 127, 32, 129, 46, 45, 46, 6, 121, 86, 88, 148, 34, 112, 122, 71, 134, 43, 40, 18, 168, 171, 196, 101, 103, 94, 155, 20, 183, 151, 126, 130, 31, 10, 16, 142, 163, 193, 36, 93, 2, 110, 105, 144, 43, 169, 175, 143, 187, 21, 36, 174, 123, 110, 139, 86, 144, 134, 37, 87, 122, 0, 90, 30, 113, 188, 1, 114, 77, 141, 70, 35, 45, 127, 164, 44, 66, 69, 12, 24, 85, 66, 84, 115, 126, 142, 107, 99, 127, 75, 164, 191, 168, 57, 146, 166, 20, 111, 107, 43, 124, 178, 175, 16, 122, 83, 186, 153, 17, 164, 136, 170, 59, 83, 57, 179, 195, 11, 38, 155, 196, 7, 162, 27, 169, 72, 20, 44, 39, 41, 29, 140, 104, 33, 165, 116, 185, 112, 195, 118, 38, 142, 4, 30, 117, 32, 138, 13, 144, 93, 89, 30, 47, 40, 159, 99, 69, 38, 3, 23, 138, 131, 167, 154, 81, 64, 144, 144, 170, 167, 190, 35, 179, 162, 31, 146, 187, 25, 80, 10, 159, 67, 15, 196, 88, 103, 91, 55, 45, 115, 5, 64, 101, 21, 67, 119, 87, 103, 178, 3, 94, 152, 179, 41, 79, 121, 26, 193, 45, 62, 83, 73, 183, 150, 22, 22, 79, 12, 101, 24, 7, 31, 26, 86, 128, 134, 174, 10, 51, 88, 152, 22, 123, 163, 107, 118, 82, 147, 84, 168, 147, 158, 146, 82, 64, 30, 142, 67, 61, 71, 173, 77, 196, 121, 195, 1, 35, 183, 115, 115, 3, 121, 45, 191, 106, 144, 166, 29, 27, 144, 62, 137, 69, 155, 182, 134, 113, 195, 0, 188, 56, 199, 100, 166, 53, 186, 128, 153, 86, 1, 152, 67, 104, 44. 190. 168. 107. 126. 180, 179, 124, 16, 135, 19, 131, 107, 142, 132, 108, 173, 76, 135, 1, 141, 114, 52, 152, 34, 96, 47, 129, 170, 125, 41, 115, 167, 14, 1, 39, 62, 187, 154, 44, 3, 8, 167, 5, 95, 83, 124, 192, 123, 105, 22, 121, 26, 86, 174, 31, 73, 100, 146, 92, 194, 11, 61, 194, 139, 67, 97, 132, 24, 198, 113, 59, 16, 41, 27, 11, 14, 172, 6, 142, 46, 184, 89, 150, 100, 65, 116, 192, 183, 60, 179, 119, 131, 66, 160, 167, 175, 53, 95, 196, 4, 27, 33, 106, 136, 49,

105, 54, 50, 82, 51, 196,

157, 198, 23, 76, 52, 41, 77, 7, 188, 46, 28, 36, 127, 32, 129, 46, 45, 46, 6, 121, 86, 88, 148, 34, 112, 122, 71, 134, 43, 40, 18, 168, 171, 196, 101, 103, 94, 155, 20, 183, 151, 126, 130, 31, 10, 16, 142, 163, 193, 36, 93, 2, 110, 105, 144, 43, 169, 175, 143, 187, 21, 36, 174, 123, 110, 139, 86, 144, 134, 37, 87, 122, 0, 90, 30, 113, 188, 1, 114, 77, 141, 70, 35, 45, 127, 164, 44, 66, 69, 12, 24, 85, 66, 84, 115, 126, 142, 107, 99, 127, 75, 164, 191, 168, 57, 146, 166, 20, 111, 107, 43, 124, 178, 175, 16, 122, 83, 186, 153, 17, 164, 136, 170, 59, 83, 57, 179, 195, 11, 38, 155, 196, 7, 162, 27, 169, 72, 20, 44, 39, 41, 29, 140, 104, 33, 165, 116, 185, 112, 195, 118, 38, 142, 4, 30, 117, 32, 138, 13, 144, 93, 89, 30, 47, 40, 159, 99, 69, 38, 3, 23, 138, 131, 167, 154, 81, 64, 144, 144, 170, 167, 190, 35, 179, 162, 31, 146, 187, 25, 80, 10, 159, 67, 15, 196, 88, 103, 91, 55, 45, 115, 5, 64, 101, 21, 67, 119, 87, 103, 178, 3, 94, 152, 179, 41, 79, 121, 26, 193, 45, 62, 83, 73, 183, 150, 22, 22, 79, 12, 101, 24, 7, 31, 26, 86, 128, 134, 174, 10, 51, 88, 152, 22, 123, 163, 107, 118, 82, 147, 84, 168, 147, 158, 146, 82, 64, 30, 142, 67, 61, 71, 173, 77, 196, 121, 195, 1, 35, 183, 115, 115, 3, 121, 45, 191, 106, 144, 166, 29, 27, 144, 62, 137, 69, 155, 182, 134, 113, 195, 0, 188, 56, 199, 100, 166, 53, 186, 128, 153, 86, 1, 152, 67, 104, 44. 190. 168. 107. 126. 180, 179, 124, 16, 135, 19, 131, 107, 142, 132, 108, 173, 76, 135, 1, 141, 114, 52, 152, 34, 96, 47, 129, 170, 125, 41, 115, 167, 14, 1, 39, 62, 187, 154, 44, 3, 8, 167, 5, 95, 83, 124, 192, 123, 105, 22, 121, 26, 86, 174, 31, 73, 100, 146, 92, 194, 11, 61, 194, 139, 67, 97, 132, 24, 198, 113, 59, 16, 41, 27, 11, 14, 172, 6, 142, 46, 184, 89, 150, 100, 65, 116, 192, 183, 60, 179, 119, 131, 66, 160, 167, 175, 53, 95, 196, 4, 27, 33, 106, 136, 49, 105, 54, 50, 82, 51, 196,

Test	Expected	Got
	78, 64, 70, 42, 131, 170,	78, 64, 70, 42, 131, 170,
	111, 109, 44, 86, 32, 107, 28, 113, 81, 57, 165, 173,	111, 109, 44, 86, 32, 107, 28, 113, 81, 57, 165, 173,
	62, 126, 178, 34, 64, 87,	62, 126, 178, 34, 64, 87,
	179, 41, 73, 148, 105, 60,	179, 41, 73, 148, 105, 60,
	42, 195, 91, 122, 31, 164,	42, 195, 91, 122, 31, 164,
	9, 130, 30, 149, 143, 85,	9, 130, 30, 149, 143, 85,
	123, 62, 76, 121, 16, 119, 163, 147, 123, 129, 113,	123, 62, 76, 121, 16, 119, 163, 147, 123, 129, 113,
	117, 136, 3, 33, 80, 25,	117, 136, 3, 33, 80, 25,
	30, 4, 27snip 7, 4,	30, 4, 27snip 7, 4,
	30, 25, 80, 33, 3, 136,	30, 25, 80, 33, 3, 136,
	117, 113, 129, 123, 147,	117, 113, 129, 123, 147,
	163, 119, 16, 121, 76, 62, 123, 85, 143, 149, 30, 130,	163, 119, 16, 121, 76, 62, 123, 85, 143, 149, 30, 130,
	9, 164, 31, 122, 91, 195,	9, 164, 31, 122, 91, 195,
	42, 60, 105, 148, 73, 41,	42, 60, 105, 148, 73, 41,
	179, 87, 64, 34, 178, 126,	179, 87, 64, 34, 178, 126,
	62, 173, 165, 57, 81, 113,	62, 173, 165, 57, 81, 113,
	28, 107, 32, 86, 44, 109, 111, 170, 131, 42, 70, 64,	28, 107, 32, 86, 44, 109, 111, 170, 131, 42, 70, 64,
	78, 196, 51, 82, 50, 54,	78, 196, 51, 82, 50, 54,
	105, 49, 136, 106, 33, 27,	105, 49, 136, 106, 33, 27,
	4, 196, 95, 53, 175, 167,	4, 196, 95, 53, 175, 167,
	160, 66, 131, 119, 179, 60,	160, 66, 131, 119, 179, 60,
	183, 192, 116, 65, 100, 150, 89, 184, 46, 142, 6,	183, 192, 116, 65, 100, 150, 89, 184, 46, 142, 6,
	172, 14, 11, 27, 41, 16,	172, 14, 11, 27, 41, 16,
	59, 113, 198, 24, 132, 97,	59, 113, 198, 24, 132, 97,
	67, 139, 194, 61, 11, 194,	67, 139, 194, 61, 11, 194,
	92, 146, 100, 73, 31, 174,	92, 146, 100, 73, 31, 174,
	86, 26, 121, 22, 105, 123, 192, 124, 83, 95, 5, 167,	86, 26, 121, 22, 105, 123, 192, 124, 83, 95, 5, 167,
	8, 3, 44, 154, 187, 62, 39,	8, 3, 44, 154, 187, 62, 39,
	1, 14, 167, 115, 41, 125,	1, 14, 167, 115, 41, 125,
	170, 129, 47, 96, 34, 152,	170, 129, 47, 96, 34, 152,
	52, 114, 141, 1, 135, 76, 173, 108, 132, 142, 107,	52, 114, 141, 1, 135, 76, 173, 108, 132, 142, 107,
	131, 19, 135, 16, 124, 179,	131, 19, 135, 16, 124, 179,
	180, 126, 107, 168, 190,	180, 126, 107, 168, 190,
	44, 104, 67, 152, 1, 86,	44, 104, 67, 152, 1, 86,
	153, 128, 186, 53, 166,	153, 128, 186, 53, 166,
	100, 199, 56, 188, 0, 195, 113, 134, 182, 155, 69,	100, 199, 56, 188, 0, 195, 113, 134, 182, 155, 69,
	137, 62, 144, 27, 29, 166,	137, 62, 144, 27, 29, 166,
	144, 106, 191, 45, 121, 3,	144, 106, 191, 45, 121, 3,
	115, 115, 183, 35, 1, 195,	115, 115, 183, 35, 1, 195,
	121, 196, 77, 173, 71, 61,	121, 196, 77, 173, 71, 61,
	67, 142, 30, 64, 82, 146, 158, 147, 168, 84, 147, 82,	67, 142, 30, 64, 82, 146, 158, 147, 168, 84, 147, 82,
	118, 107, 163, 123, 22,	118, 107, 163, 123, 22,
	152, 88, 51, 10, 174, 134,	152, 88, 51, 10, 174, 134,
	128, 86, 26, 31, 7, 24,	128, 86, 26, 31, 7, 24,
	101, 12, 79, 22, 22, 150, 183 73 83 62 45 193	101, 12, 79, 22, 22, 150, 183 73 83 62 45 193
	183, 73, 83, 62, 45, 193, 26, 121, 79, 41, 179, 152,	183, 73, 83, 62, 45, 193, 26, 121, 79, 41, 179, 152,
	94, 3, 178, 103, 87, 119,	94, 3, 178, 103, 87, 119,
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	15, 67, 159, 10, 80, 25, 187, 146, 31, 162, 179, 35,	15, 67, 159, 10, 80, 25, 187, 146, 31, 162, 179, 35,
	190, 167, 170, 144, 144,	190, 167, 170, 144, 144,
	64, 81, 154, 167, 131, 138,	64, 81, 154, 167, 131, 138,
	23, 3, 38, 69, 99, 159, 40,	23, 3, 38, 69, 99, 159, 40,
	47, 30, 89, 93, 144, 13,	47, 30, 89, 93, 144, 13,
	138, 32, 117, 30, 4, 142,	138, 32, 117, 30, 4, 142,
	38, 118, 195, 112, 185, 116, 165, 33, 104, 140, 29,	38, 118, 195, 112, 185, 116, 165, 33, 104, 140, 29,
	41, 39, 44, 20, 72, 169,	41, 39, 44, 20, 72, 169,
	27, 162, 7, 196, 155, 38,	27, 162, 7, 196, 155, 38,
	11, 195, 179, 57, 83, 59,	11, 195, 179, 57, 83, 59,

	Test	Expected	Got
		170, 136, 164, 17, 153,	170, 136, 164, 17, 153,
		186, 83, 122, 16, 175, 178, 124, 43, 107, 111, 20, 166,	186, 83, 122, 16, 175, 178, 124, 43, 107, 111, 20, 166,
		146, 57, 168, 191, 164, 75,	146, 57, 168, 191, 164, 75,
		127, 99, 107, 142, 126, 115, 84, 66, 85, 24, 12,	127, 99, 107, 142, 126, 115, 84, 66, 85, 24, 12,
		69, 66, 44, 164, 127, 45,	69, 66, 44, 164, 127, 45,
		35, 70, 141, 77, 114, 1,	35, 70, 141, 77, 114, 1,
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		110, 123, 174, 36, 21, 187,	110, 123, 174, 36, 21, 187,
		143, 175, 169, 43, 144, 105, 110, 2, 93, 36, 193,	143, 175, 169, 43, 144, 105, 110, 2, 93, 36, 193,
		163, 142, 16, 10, 31, 130,	163, 142, 16, 10, 31, 130,
		126, 151, 183, 20, 155, 94,	126, 151, 183, 20, 155, 94,
		103, 101, 196, 171, 168, 18, 40, 43, 134, 71, 122,	103, 101, 196, 171, 168, 18, 40, 43, 134, 71, 122,
		112, 34, 148, 88, 86, 121,	112, 34, 148, 88, 86, 121,
		6, 46, 45, 46, 129, 32,	6, 46, 45, 46, 129, 32,
		127, 36, 28, 46, 188, 7, 77, 41, 52, 76, 23, 198,	127, 36, 28, 46, 188, 7, 77, 41, 52, 76, 23, 198,
		157, 79, 25, 129, 13, 148,	157, 79, 25, 129, 13, 148,
		185, 109, 82, 25, 64, 138, 128, 83, 119, 134, 178,	185, 109, 82, 25, 64, 138, 128, 83, 119, 134, 178,
		158, 26, 136, 180, 74, 180,	158, 26, 136, 180, 74, 180,
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		147, 161, 105, 176, 74, 151, 199, 129, 180, 79,	147, 161, 105, 176, 74, 151, 199, 129, 180, 79,
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		86, 40, 67, 133, 121, 190,	86, 40, 67, 133, 121, 190,
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	125, 197, 32, 63, 32, 118,	125, 197, 32, 63, 32, 118,	
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	11, 6, 164, 53, 108, 66,	11, 6, 164, 53, 108, 66,	
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	96, 189, 156, 121, 103,	96, 189, 156, 121, 103,	
	183, 98, 126, 94, 30, 85,	183, 98, 126, 94, 30, 85,	
	73, 104, 101, 102, 86, 128,	73, 104, 101, 102, 86, 128,	
	161, 95, 114, 61, 29, 132,	161, 95, 114, 61, 29, 132,	
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	19, 122, 126, 15, 139, 2,	19, 122, 126, 15, 139, 2,	
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	125, 85, 99, 79, 40, 100,	125, 85, 99, 79, 40, 100,	
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190, 163, 42, 68, 172, 41, 91, 156, 198, 43, 3, 41, 91, 156, 198, 43, 3, 0, 94, 63, 164, 116, 156, 81, 16, 184, 190, 11, 96, 90, 18, 46, 65, 81, 96, 90, 18, 46, 65, 81, 100, 12, 40, 125, 3, 0, 153, 164, 91, 95, 109, 153, 10, 20, 83, 19, 85, 153, 10, 20, 83, 19, 85, 67, 5, 65, 64, 85, 190, 192, 61, 145, 185, 5, 40, 40, 147, 88, 111, 10, 112, 40, 147, 88, 111, 10, 112, 7, 136, 188, 185, 43, 128, 157, 186, 152, 29, 193, 49, 179, 165, 192, 78, 193, 49, 179, 165, 192, 78, 196, 74, 198, 182, 147, 115, 126, 11, 127, 129, 55, 64, 36, 57, 79, 144, 55, 64, 36, 57, 79, 144, 141, 52, 80, 189, 104, 123, 117, 104, 128, 164, 140, 175, 145, 83, 65, 174, 140, 175, 145, 83, 65, 174, 7, 36, 70, 60, 21, 63, 96, 16, 177, 145, 4, 72, 197, 174, 9, 31, 164, 62, 197, 174, 9, 31, 164, 62, 64, 145, 132, 4, 191, 146, 42, 53, 196, 84, 150, 9, 176, 45, 151, 139, 12, 9, 176, 45, 151, 139, 12, 144, 171, 177, 151, 102, 127, 51, 32, 127, 133, 2, 4, 111, 142, 71, 120, 144, 171, 177, 151, 102, 181, 120, 61, 24, 31, 32, 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Expected 138, 132, 20, 114, 131, 155, 41, 40, 194, 118, 34, 67, 173, 153, 186, 116, 193, 145, 190, 78, 169, 109, 125, 146, 74, 174, 175, 134, 119, 169, 124, 195, 96, 19, 6, 38, 72, 21, 138, 122, 23, 127, 59, 100, 165, 25, 199, 175, 153, 192, 38, 121, 177, 78, 40, 142, 122, 190, 95, 179, 155, 158, 5, 61, 5, 117, 150, 43, 5, 111, 161, 145, 69, 183, 147, 15, 135, 28, 101, 138, 164, 39, 160, 129, 69, 188, 54, 194, 112, 103, 34, 62, 84, 161, 170, 42, 8, 75, 132, 152, 121, 74, 31, 77, 147, 84, 187, 132, 43, 170, 52, 83, 42, 62, 147, 149, 164, 70, 21, 24, 145, 26, 16, 143, 76, 59, 68, 18, 27, 100, 158, 100, 102, 30, 75, 86, 115, 54, 66, 91, 136, 137, 154, 60, 107, 164, 55, 108, 71, 101, 47, 14, 64, 94, 154, 102, 89, 139, 89, 133, 180, 121, 62, 9, 10, 106, 37, 4, 131, 78, 129, 76, 48, 156, 89, 11, 15, 169, 132, 184, 46, 192, 12, 14, 180, 68, 127, 99, 165, 130, 139, 67, 124, 58, 75, 46, 166, 38, 37, 0, 92, 60, 183, 23, 129, 57, 121, 82, 21, 95, 123, 72, 169, 168, 106, 71, 36, 67, 40, 110, 166, 103, 170, 197, 187, 158, 190, 163, 42, 68, 172, 0, 94, 63, 164, 116, 156, 81, 16, 184, 190, 11, 100, 12, 40, 125, 3, 0, 153, 164, 91, 95, 109, 67, 5, 65, 64, 85, 190, 192, 61, 145, 185, 5, 40, 7, 136, 188, 185, 43, 128, 157, 186, 152, 29, 196, 74, 198, 182, 147, 115, 126, 11, 127, 129, 141, 52, 80, 189, 104, 123, 117, 104, 128, 164, 7, 36, 70, 60, 21, 63, 96, 16, 177, 145, 4, 72, 64, 145, 132, 4, 191, 146, 42, 53, 196, 84, 150, 127, 51, 32, 127, 133, 2, 4, 111, 142, 71, 120, 154, 87, 112, 56, 103, 121, 84, 35, 111, 52, 104, 43, 78, 108, 108, 6, 160, 171, 7, 180, 158, 127, 48, 98, 129, 157, 127, 7, 102, 94, 155, 37, 83, 65, 142, 82, 33, 194, 150, 31, 10, 121, 156, 113, 61, 142, 42, 22, 183, 108, 49, 146, 172, 123, 145, 131, 175, 26, 20, 153, 78, 76, 85, 3, 42, 107, 5, 78, 61, 195, 47, 47, 93, 24, 173, 186, 112, 66, 1, 28, 40, 72, 56, 198, 105, 67, 44, 75, 152,

138, 132, 20, 114, 131, 155, 41, 40, 194, 118, 34, 67, 173, 153, 186, 116, 193, 145, 190, 78, 169, 109, 125, 146, 74, 174, 175, 134, 119, 169, 124, 195, 96, 19, 6, 38, 72, 21, 138, 122, 23, 127, 59, 100, 165, 25, 199, 175, 153, 192, 38, 121, 177, 78, 40, 142, 122, 190, 95, 179, 155, 158, 5, 61, 5, 117, 150, 43, 5, 111, 161, 145, 69, 183, 147, 15, 135, 28, 101, 138, 164, 39, 160, 129, 69, 188, 54, 194, 112, 103, 34, 62, 84, 161, 170, 42, 8, 75, 132, 152, 121, 74, 31, 77, 147, 84, 187, 132, 43, 170, 52, 83, 42, 62, 147, 149, 164, 70, 21, 24, 145, 26, 16, 143, 76, 59, 68, 18, 27, 100, 158, 100, 102, 30, 75, 86, 115, 54, 66, 91, 136, 137, 154, 60, 107, 164, 55, 108, 71, 101, 47, 14, 64, 94, 154, 102, 89, 139, 89, 133, 180, 121, 62, 9, 10, 106, 37, 4, 131, 78, 129, 76, 48, 156, 89, 11, 15, 169, 132, 184, 46, 192, 12, 14, 180, 68, 127, 99, 165, 130, 139, 67, 124, 58, 75, 46, 166, 38, 37, 0, 92, 60, 183, 23, 129, 57, 121, 82, 21, 95, 123, 72, 169, 168, 106, 71, 36, 67, 40, 110, 166, 103, 170, 197, 187, 158, 190, 163, 42, 68, 172, 0, 94, 63, 164, 116, 156, 81, 16, 184, 190, 11, 100, 12, 40, 125, 3, 0, 153, 164, 91, 95, 109, 67, 5, 65, 64, 85, 190, 192, 61, 145, 185, 5, 40, 7, 136, 188, 185, 43, 128, 157, 186, 152, 29, 196, 74, 198, 182, 147, 115, 126, 11, 127, 129, 141, 52, 80, 189, 104, 123, 117, 104, 128, 164, 7, 36, 70, 60, 21, 63, 96, 16, 177. 145. 4. 72. 64. 145. 132, 4, 191, 146, 42, 53, 196, 84, 150, 127, 51, 32, 127, 133, 2, 4, 111, 142, 71, 120, 154, 87, 112, 56, 103, 121, 84, 35, 111, 52, 104, 43, 78, 108, 108, 6, 160, 171, 7, 180, 158, 127, 48, 98, 129, 157, 127, 7, 102, 94, 155, 37, 83, 65, 142, 82, 33, 194, 150, 31, 10, 121, 156, 113, 61, 142, 42, 22, 183, 108, 49, 146, 172, 123, 145, 131, 175, 26, 20, 153, 78, 76, 85, 3, 42, 107, 5, 78, 61, 195, 47, 47, 93, 24, 173, 186, 112, 66, 1, 28, 40, 72, 56, 198, 105, 67, 44, 75, 152,

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177, 136, 127, 88, 86, 83, 63, 142, 113, 20, 195, 26, 38, 53, 156, 65, 146, 29, 131, 189, 32, 85, 157, 183, 125, 92, 122, 187, 93, 161, 67, 148, 181, 47, 195, 35, 35, 54, 80, 82, 83, 55, 34, 117, 139, 192, 75, 163, 41, 9, 150, 32, 36, 102, 117, 55, 120, 142, 14, 144, 165, 91, 174, 124, 2, 19, 1, 112, 55, 14, 184, 185, 24, 113, 20, 13, 177, 19, 154, 75, 102, 22, 120, 51, 105, 168, 119, 136, 186, 162, 65, 13, 42, 177, 4, 6, 152, 179, 16, 1, 0, 28, 14, 93, 177, 2, 154, 10, 110, 38, 138, 193, 87, 116, 55, 188, 137, 20, 139, 153, 195, 34, 171, 140, 146, 146, 192, 19, 39, 129, 33, 142, 40, 144, 83, 190, 45, 2, 123, 36, 19, 40, 147, 13, 54, 107, 195, 117, 74, 50, 130, 147, 83, 68, 150, 132, 110, 152, 8, 138, 104, 35, 139, 69, 93, 162, 78, 170, 131, 128, 72, 148, 96, 3, 108, 184, 162, 82, 5, 70, 46, 137, 148, 37, 186, 17, 39, 93, 23, 129, 132, 11, 153, 170, 111, 112, 129, 169, 128, 11, 37, 198, 104}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead); newhead->clear();

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76, 143, 16, 26, 145, 24,

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Test	Expected	Got
	43, 191, 64, 183, 2, 107,	43, 191, 64, 183, 2, 107,
	128, 101, 31, 94, 62, 132,	128, 101, 31, 94, 62, 132,
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	173, 155, 88, 74, 13, 35,	173, 155, 88, 74, 13, 35,
	161, 55, 12]	161, 55, 12]

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Expected [161, 86, 21, 22, 162, 98, 98, 173, 5, 27, 179, 24, 119, 72, 32, 73, 120, 115, 38, 21, 134, 59, 141, 180, 198, 162, 143, 0, 64, 98, 34, 181, 51, 179, 15, 128, 145, 152, 115, 10, 148, 75, 126, 31, 1, 78, 171, 73, 4, 4, 119, 35, 116, 126, 30, 171, 112, 194, 74, 39, 58, 82, 61, 84, 59, 49, 185, 43, 47, 11, 29, 53, 146, 197, 115, 48, 4, 66, 160, 18, 97, 88, 36, 77, 140, 59, 147, 100, 69, 40, 179, 93, 104, 84, 39, 191, 120, 118, 122, 190, 59, 195, 40, 61, 48, 49, 170, 164, 23, 70, 97, 146, 16, 81, 173, 188, 102, 192, 13, 70, 77, 28, 90, 121, 186, 74, 199, 166, 194, 28, 36, 98, 118, 88, 84, 19, 93, 103, 3, 138, 170, 120, 44, 49, 104, 45, 65, 87, 11, 127, 180, 178, 9, 38, 94, 52, 104, 179, 111, 96, 106, 130, 21, 39, 135, 42, 0, 134, 113, 79, 141, 171, 198, 114, 105, 48, 129, 94, 33, 31, 186, 30, 40, 111, 95, 166, 33, 125, 35, 96, 77, 166, 7, 160, 62, 188, 70, 73, 29, 39, 141, 81, 170, 7, 106, 146, 154, 15, 27, 155, 157, 51, 91, 103, 152, 78, 130, 156, 129, 21, 66, 119, 170, 176, 177, 5, 159, 98, 91, 29, 51, 22, 199, 125, 192, 61, 70, 10, 29, 85, 23, 4, 61, 52, 135, 9, 182, 14, 135, 32, 199, 123, 30, 9, 102, 189, 24, 99, 136, 96, 15, 126, 82, 162, 41, 147, 128, 21, 179, 1, 180, 147, 109, 33, 97, 114, 5, 11, 128, 112, 128, 106, 75, 128, 70, 158, 184, 21, 117, 25, 33, 79, 33, 77, 137, 164, 147, 163, 57, 88, 199, 111, 85, 48, 163, 50, 32, 124, 133, 7, 159, 19, 52, 67, 109, 35, 42, 127, 34, 185, 55, 15, 113, 190, 49, 160, 74, 155, 60, 6, 173, 198, 109, 195, 129, 125, 35, 111, 20, 74, 95, 124, 83, 176, 115, 121, 4, 86, 114, 170, 138, 145, 31, 86, 89, 174, 48, 89, 115, 88, 116, 154, 58, 63, 130, 79, 167, 42, 28, 56, 171, 134, 180, 58, 76, 79, 150, 157, 89, 30, 63, 144, 185, 124, 196, 164, 97, 55, 21, 70, 189, 2, 147, 40, 82, 1, 32, 186, 57, 150, 46, 173, 110, 77, 187, 33, 17, 183, 52, 48, 108, 189, 112, 74, 135, 139, 134, 130, 57, 160, 8, 81, 160, 66, 146, 9, 99,

[161, 86, 21, 22, 162, 98, 98, 173, 5, 27, 179, 24, 119, 72, 32, 73, 120, 115, 38, 21, 134, 59, 141, 180, 198, 162, 143, 0, 64, 98, 34, 181, 51, 179, 15, 128, 145, 152, 115, 10, 148, 75, 126, 31, 1, 78, 171, 73, 4, 4, 119, 35, 116, 126, 30, 171, 112, 194, 74, 39, 58, 82, 61, 84, 59, 49, 185, 43, 47, 11, 29, 53, 146, 197, 115, 48, 4, 66, 160, 18, 97, 88, 36, 77, 140, 59, 147, 100, 69, 40, 179, 93, 104, 84, 39, 191, 120, 118, 122, 190, 59, 195, 40, 61, 48, 49, 170, 164, 23, 70, 97, 146, 16, 81, 173, 188, 102, 192, 13, 70, 77, 28, 90, 121, 186, 74, 199, 166, 194, 28, 36, 98, 118, 88, 84, 19, 93, 103, 3, 138, 170, 120, 44, 49, 104, 45, 65, 87, 11, 127, 180, 178, 9, 38, 94, 52, 104, 179, 111, 96, 106, 130, 21, 39, 135, 42, 0, 134, 113, 79, 141, 171, 198, 114, 105, 48, 129, 94, 33, 31, 186, 30, 40, 111, 95, 166, 33, 125, 35, 96, 77, 166, 7, 160, 62, 188, 70, 73, 29, 39, 141, 81, 170, 7, 106, 146, 154, 15, 27, 155, 157, 51, 91, 103, 152, 78, 130, 156, 129, 21, 66, 119, 170, 176, 177, 5, 159, 98, 91, 29, 51, 22, 199, 125, 192, 61, 70, 10, 29, 85, 23, 4, 61, 52, 135, 9, 182, 14, 135, 32, 199, 123, 30, 9, 102, 189, 24, 99, 136, 96, 15, 126, 82, 162, 41, 147, 128, 21, 179, 1, 180, 147, 109, 33, 97, 114, 5, 11, 128, 112, 128, 106, 75, 128, 70, 158, 184, 21, 117, 25, 33, 79, 33, 77, 137, 164, 147, 163, 57, 88, 199, 111, 85, 48, 163, 50, 32, 124, 133, 7, 159, 19, 52, 67, 109, 35, 42, 127, 34, 185, 55, 15, 113, 190, 49, 160, 74, 155, 60, 6, 173, 198, 109, 195, 129, 125, 35, 111, 20, 74, 95, 124, 83, 176, 115, 121, 4, 86, 114, 170, 138, 145, 31, 86, 89, 174, 48, 89, 115, 88, 116, 154, 58, 63, 130, 79, 167, 42, 28, 56, 171, 134, 180, 58, 76, 79, 150, 157, 89, 30, 63, 144, 185, 124, 196, 164, 97, 55, 21, 70, 189, 2, 147, 40, 82, 1, 32, 186, 57, 150, 46, 173, 110, 77, 187, 33, 17, 183, 52, 48, 108, 189, 112, 74, 135, 139, 134, 130, 57, 160, 8, 81, 160, 66, 146, 9, 99,

123, 176, 78, 51, 101, 89, 126, 55, 117, 52, 54, 101, 30, 4, 146, 57, 10, 23, 166, 56, 26, 67, 102, 22, 175, 115, 108, 139, 121, 131, 189, 42, 184, 176, 77, 194, 66, 91, 12, 16, 116, 184, 144, 36, 180, 194, 13, 155, 174, 186, 99, 109, 78, 111, 0, 16, 150, 72, 29, 61, 168, 168, 156, 33, 6, 41, 34, 94, 111, 84, 138, 107, 93, 191, 163, 66, 117, 24, 42, 97, 95, 17, 83, 131, 79, 29, 60, 31, 170, 163, 114, 1, 5, 88, 129, 192, 51, 97, 182, 144, 45, 2, 55, 24, 111, 0, 181, 63, 9, 174, 88, 171, 163, 70, 124, 34, 124, 69, 132, 140, 45, 52, 156, 33, 73, 101 ...snip... 1, 68, 133, 165, 136, 33, 175, 48, 79, 135, 86, 101, 172, 29, 63, 20, 65, 107, 193, 2, 148, 118, 21, 73, 154, 4, 159, 106, 176, 82, 188, 136, 194, 4, 156, 135, 159, 158, 122, 109, 141, 112, 26, 175, 1, 7, 147, 55, 50, 74, 69, 53, 79, 105, 92, 156, 61, 61, 69, 15, 5, 108, 160, 91, 150, 92, 79, 94, 199, 58, 166, 8, 31, 163, 132, 145, 137, 82, 193, 75, 178, 163, 88, 74, 77, 25, 87, 73, 9, 171, 68, 95, 113, 91, 42, 98, 36, 50, 93, 18, 46, 118, 115, 114, 7, 78, 115, 34, 3, 8, 74, 88, 17, 32, 171, 56, 128, 52, 102, 65, 71, 77, 45, 98, 99, 193, 75, 22, 54, 39, 150, 148, 110, 106, 183, 105, 156, 122, 176, 58, 38, 151, 101, 45, 32, 7, 165, 151, 62, 50, 75, 115, 181, 60, 184, 73, 11, 28, 11, 38, 67, 50, 60, 83, 45, 46, 61, 40, 30, 126, 10, 130, 68, 72, 195, 178, 21, 17, 39, 144, 161, 37, 43, 120, 108, 105, 20, 196, 112, 196, 105, 34, 75, 53, 84, 119, 157, 81, 11, 52, 181, 28, 2, 56, 164, 178, 83, 95, 50, 62, 57, 74, 151, 179, 161, 54, 189, 34, 185, 137, 116, 19, 190, 106, 142, 110, 49, 113, 101, 172, 137, 191, 193, 98, 23, 39, 110, 103, 134, 53, 13, 78, 66, 13, 82, 102, 50, 71, 23, 135, 33, 162, 150, 167, 137, 31, 196, 63, 33, 184, 45, 72, 185, 80, 50, 81, 74, 140, 146, 93, 124, 147, 8, 137, 10, 130, 113, 180, 145, 2, 9, 138, 137, 198, 127, 170, 59, 32, 165, 182, 172, 12, 140, 146, 104, 55, 0, 121, 11, 185, 88, 53, 100, 89, 194, 46, 155, 47, 20, 141, 148, 88, 13, 137, 36, 133, 37, 138, 107, 174, 178, 44, 131, 69, 124, 85, 88, 133, 92, 66, 113, 93, 105, 39, 54, 167, 98, 151, 90, 191, 195, 3, 107, 16, 130, 133, 152, 152, 57, 104, 10, 199, 25, 64, 158, 28, 12, 96, 137, 105, 4, 68, 149, 176, 179, 27, 84, 182, 114, 34, 98, 175, 46, 165, 7, 18, 159, 198, 101, 30, 11, 155, 168, 133, 99, 124, 132, 152, 68, 74, 123, 76, 17, 14, 182, 11, 7, 113, 91, 77, 65, 111, 81, 113, 197, 82, 144, 71, 126, 68, 124, 176, 172, 197, 124, 40, 193, 78, 149, 34, 76, 68, 29, 60, 108, 98, 29, 69, 173, 144, 158, 109, 175, 40, 167, 44, 120, 163, 117, 30, 94, 23, 117, 156, 162, 188, 190, 198, 161, 47, 3, 25, 165, 78, 7, 187, 187, 78, 33, 15, 174, 57, 34, 45, 100, 76, 77, 136, 103, 136, 135, 95, 55, 38, 167, 100, 118, 105, 127, 33, 125, 191, 139, 77, 45, 160, 122, 161, 64, 18, 27, 7, 152, 140, 114, 165, 160, 146, 19, 118, 51, 81, 149, 74, 1, 99, 187, 64, 161, 116, 95, 113, 139, 6, 32, 198, 181, 154, 142, 164, 145, 120, 67, 167, 5, 1, 132, 157, 11, 115, 128, 181, 114, 165, 80, 160, 125, 188, 144, 134, 194, 37, 165, 180, 157, 123, 40, 61, 182, 19, 10, 158, 40, 55, 0, 78, 140, 168, 161, 126, 37, 183, 60, 46, 93, 141, 160, 184, 113, 162, 199, 192, 0, 139, 50, 196, 98, 111, 19, 97, 174, 37, 79, 119, 188, 94, 98, 85, 52, 88, 16, 183, 191, 86, 65, 23, 109, 186, 124, 27, 22, 12, 167, 110, 13, 48, 134, 128, 113, 75, 178, 170, 198, 142, 36, 93, 125, 182, 58, 59, 47, 130, 153, 121, 23, 31, 181, 122, 192, 58, 52, 111, 140, 68, 57, 126, 16, 106, 144, 57, 84, 157, 85, 33, 79, 118,

Expected 175, 158, 4, 93, 57, 50, 199, 20, 122, 61, 177, 19, 65, 13, 144, 93, 195, 197, 79, 116, 125, 53, 80, 145, 193, 26, 64, 28, 104, 168, 187, 149, 183, 133, 86, 4, 100, 31, 52, 135, 123, 57, 178, 138, 28, 18, 151, 28, 183, 198, 78, 127, 115, 162, 23, 152, 195, 2, 93, 96, 27, 61, 152, 130, 65, 91, 118, 158, 167, 142, 69, 173, 176, 175, 197, 94, 65, 114, 84, 185, 66, 4, 57, 2, 125, 156, 85, 159, 54, 176, 7, 173, 75, 106, 63, 121, 39, 115, 117, 59, 41, 29, 99, 111, 122, 95, 184, 79, 159, 109, 110, 187, 196, 119, 135, 115, 34, 131, 75, 102, 57, 133, 109, 100, 10, 37, 96, 89, 158, 194, 3, 178, 195, 102, 140, 173, 137, 106, 164, 188, 183, 172, 47, 179, 164, 189, 160, 171, 75, 112, 50, 165, 173, 136, 73, 58, 117, 25, 138, 123, 153, 98, 57, 61, 157, 129, 10, 175, 172, 111, 122, 151, 137, 102, 158, 25, 138, 40, 116, 17, 39, 146, 17, 156, 106, 57, 66, 162, 175, 131, 31, 63, 93, 74, 29, 18, 14, 76, 171, 13, 124, 22, 112, 70, 108, 91, 91, 109, 159, 175, 82, 167, 142, 81, 95, 98, 135, 16, 192, 99, 182, 77, 30, 69, 125, 82, 65, 66, 142, 169, 137, 142, 56, 64, 184, 50, 9, 27, 142, 135, 107, 11, 77, 171, 26, 158, 158, 9, 116, 110, 51, 124, 162, 150, 71, 20, 63, 27, 11, 125, 46, 63, 171, 67, 177, 140, 56, 163, 143, 191, 55, 190, 37, 171, 74, 183, 49, 175, 157, 183, 74, 114, 75, 30, 100, 95, 106, 85, 35, 156, 149, 114, 14, 7, 81, 180, 134, 130, 10, 120, 71, 62, 158, 187, 78, 95, 154, 161, 35, 199, 196, 141, 81, 149, 64, 145, 132, 119, 39, 49, 74, 197, 54, 163, 165, 144, 163, 129, 184, 27, 28, 3, 176, 177, 27, 54, 101, 31, 29, 130, 129, 19, 91, 123, 176, 78, 51, 101, 89, 126, 55, 117, 52, 54, 101, 30, 4, 146, 57, 10, 23, 166, 56, 26, 67, 102, 22, 175, 115, 108, 139, 121, 131, 189, 42, 184, 176, 77, 194, 66, 91, 12, 16, 116, 184, 144, 36, 180, 194, 13, 155, 174, 186, 99, 109, 78, 111, 0, 16, 150, 72, 29, 61, 168, 168, 156, 33, 6, 41, 34,

94, 111, 84, 138, 107, 93,

175, 158, 4, 93, 57, 50, 199, 20, 122, 61, 177, 19, 65, 13, 144, 93, 195, 197, 79, 116, 125, 53, 80, 145, 193, 26, 64, 28, 104, 168, 187, 149, 183, 133, 86, 4, 100, 31, 52, 135, 123, 57, 178, 138, 28, 18, 151, 28, 183, 198, 78, 127, 115, 162, 23, 152, 195, 2, 93, 96, 27, 61, 152, 130, 65, 91, 118, 158, 167, 142, 69, 173, 176, 175, 197, 94, 65, 114, 84, 185, 66, 4, 57, 2, 125, 156, 85, 159, 54, 176, 7, 173, 75, 106, 63, 121, 39, 115, 117, 59, 41, 29, 99, 111, 122, 95, 184, 79, 159, 109, 110, 187, 196, 119, 135, 115, 34, 131, 75, 102, 57, 133, 109, 100, 10, 37, 96, 89, 158, 194, 3, 178, 195, 102, 140, 173, 137, 106, 164, 188, 183, 172, 47, 179, 164, 189, 160, 171, 75, 112, 50, 165, 173, 136, 73, 58, 117, 25, 138, 123, 153, 98, 57, 61, 157, 129, 10, 175, 172, 111, 122, 151, 137, 102, 158, 25, 138, 40, 116, 17, 39, 146, 17, 156, 106, 57, 66, 162, 175, 131, 31, 63, 93, 74, 29, 18, 14, 76, 171, 13, 124, 22, 112, 70, 108, 91, 91, 109, 159, 175, 82, 167, 142, 81, 95, 98, 135, 16, 192, 99, 182, 77, 30, 69, 125, 82, 65, 66, 142, 169, 137, 142, 56, 64, 184, 50, 9, 27, 142, 135, 107, 11, 77, 171, 26, 158, 158, 9, 116, 110, 51, 124, 162, 150, 71, 20, 63, 27, 11, 125, 46, 63, 171, 67, 177, 140, 56, 163, 143, 191, 55, 190, 37, 171, 74, 183, 49, 175, 157, 183, 74, 114, 75, 30, 100, 95, 106, 85, 35, 156, 149, 114, 14, 7, 81, 180, 134, 130, 10, 120, 71, 62, 158, 187, 78, 95, 154, 161, 35, 199, 196, 141, 81, 149, 64, 145, 132, 119, 39, 49, 74, 197, 54, 163, 165, 144, 163, 129, 184, 27, 28, 3, 176, 177, 27, 54, 101, 31, 29, 130, 129, 19, 91, 123, 176, 78, 51, 101, 89, 126, 55, 117, 52, 54, 101, 30, 4, 146, 57, 10, 23, 166, 56, 26, 67, 102, 22, 175, 115, 108, 139, 121, 131, 189, 42, 184, 176, 77, 194, 66, 91, 12, 16, 116, 184, 144, 36, 180, 194, 13, 155, 174, 186, 99, 109, 78, 111, 0, 16, 150, 72, 29, 61, 168, 168, 156, 33, 6, 41, 34, 94, 111, 84, 138, 107, 93,

Ex

18, 114, 90, 199, 96, 168, 84, 183, 38, 74, 182, 196, 104, 15, 192, 101, 98, 38, 156, 192, 133, 170, 72, 178, 112, 142, 130, 133, 131, 5, 56, 7, 160, 85, 21, 193, 92, 173, 67, 148, 68, 92, 85, 91, 187, 164, 3, 85, 51, 88, 20, 121, 50, 169, 31, 16, 111, 119, 195, 53, 165, 198, 184, 168, 111, 63, 117, 83, 44, 65, 20, 92, 94, 135, 178, 133, 141, 163, 75, 128, 82, 51, 150, 23, 120, 44, 188, 187, 93, 37, 63, 99, 58, 53, 1, 80, 191, 174, 146, 126, 11, 196, 111, 126, 162, 169, 175, 74, 168, 99, 103, 136, 28, 97, 64, 74, 81, 10, 87, 117, 41, 54, 110, 193, 43, 137, 26, 8, 159, 29, 77, 115, 7, 110, 60, 81, 0, 148, 187, 137, 193, 189, 95, 35, 172, 42, 12, 18, 58, 11, 56, 180, 188, 44, 16, 125, 39, 146, 195, 72, 120, 113, 172, 176, 72, 16, 3, 46, 41, 64, 125, 180, 98, 144, 147, 1, 104, 76, 41, 166, 38, 151, 72, 41, 69, 87, 126, 87, 23, 72, 92, 112, 49, 92, 64, 109, 104, 17, 124, 93, 125, 19, 167, 97, 123}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head); LLNode::printList(newhead);

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Expected

191, 163, 66, 117, 24, 42, 97, 95, 17, 83, 131, 79, 29, 60, 31, 170, 163, 114, 1, 5, 88, 129, 192, 51, 97, 182, 144, 45, 2, 55, 24, 111, 0, 181, 63, 9, 174, 88, 171, 163, 70, 124, 34, 124, 69, 132, 140, 45, 52, 156, 33, 73, 101, 146, 103, ...snip... 103, 146, 101, 73, 33, 156, 52, 45, 140, 132, 69, 124, 34, 124, 70, 163, 171, 88, 174, 9, 63, 181, 0, 111, 24, 55, 2, 45, 144, 182, 97, 51, 192, 129, 88, 5, 1, 114, 163, 170, 31, 60, 29, 79, 131, 83, 17, 95, 97, 42, 24, 117, 66, 163, 191, 93, 107, 138, 84, 111, 94, 34, 41, 6, 33, 156, 168, 168, 61, 29, 72, 150, 16, 0, 111, 78, 109, 99, 186, 174, 155, 13, 194, 180, 36, 144, 184, 116, 16, 12, 91, 66, 194, 77, 176, 184, 42, 189, 131, 121, 139, 108, 115, 175, 22, 102, 67, 26, 56, 166, 23, 10, 57, 146, 4, 30, 101, 54, 52, 117, 55, 126, 89, 101, 51, 78, 176, 123, 91, 19, 129, 130, 29, 31, 101, 54, 27, 177, 176, 3, 28, 27, 184, 129, 163, 144, 165, 163, 54, 197, 74, 49, 39, 119, 132, 145, 64, 149, 81, 141, 196, 199, 35, 161, 154, 95, 78, 187, 158, 62, 71, 120, 10, 130, 134, 180, 81, 7, 14, 114, 149, 156, 35, 85, 106, 95, 100, 30, 75, 114, 74, 183, 157, 175, 49, 183, 74, 171, 37, 190, 55, 191, 143, 163, 56, 140, 177, 67, 171, 63, 46, 125, 11, 27, 63, 20, 71, 150, 162, 124, 51, 110, 116, 9, 158, 158, 26, 171, 77, 11, 107, 135, 142, 27, 9, 50, 184, 64, 56, 142, 137, 169, 142, 66, 65, 82, 125, 69, 30, 77, 182, 99, 192, 16, 135, 98, 95, 81, 142, 167, 82, 175, 159, 109, 91, 91, 108, 70, 112, 22, 124, 13, 171, 76, 14, 18, 29, 74, 93, 63, 31, 131, 175, 162, 66, 57, 106, 156, 17, 146, 39, 17, 116, 40, 138, 25, 158, 102, 137, 151, 122, 111, 172, 175, 10, 129, 157, 61, 57, 98, 153, 123, 138, 25, 117, 58, 73, 136, 173, 165, 50, 112, 75, 171, 160, 189, 164, 179, 47, 172, 183, 188, 164, 106, 137, 173, 140, 102, 195, 178, 3, 194, 158, 89, 96, 37, 10, 100, 109, 133, 57, 102, 75, 131, 34, 115, 135,

119, 196, 187, 110, 109,

Got

191, 163, 66, 117, 24, 42, 97, 95, 17, 83, 131, 79, 29, 60, 31, 170, 163, 114, 1, 5, 88, 129, 192, 51, 97, 182, 144, 45, 2, 55, 24, 111, 0, 181, 63, 9, 174, 88, 171, 163, 70, 124, 34, 124, 69, 132, 140, 45, 52, 156, 33, 73, 101, 146, 103, ...snip... 103, 146, 101, 73, 33, 156, 52, 45, 140, 132, 69, 124, 34, 124, 70, 163, 171, 88, 174, 9, 63, 181, 0, 111, 24, 55, 2, 45, 144, 182, 97, 51, 192, 129, 88, 5, 1, 114, 163, 170, 31, 60, 29, 79, 131, 83, 17, 95, 97, 42, 24, 117, 66, 163, 191, 93, 107, 138, 84, 111, 94, 34, 41, 6, 33, 156, 168, 168, 61, 29, 72, 150, 16, 0, 111, 78, 109, 99, 186, 174, 155, 13, 194, 180, 36, 144, 184, 116, 16, 12, 91, 66, 194, 77, 176, 184, 42, 189, 131, 121, 139, 108, 115, 175, 22, 102, 67, 26, 56, 166, 23, 10, 57, 146, 4, 30, 101, 54, 52, 117, 55, 126, 89, 101, 51, 78, 176, 123, 91, 19, 129, 130, 29, 31, 101, 54, 27, 177, 176, 3, 28, 27, 184, 129, 163, 144, 165, 163, 54, 197, 74, 49, 39, 119, 132, 145, 64, 149, 81, 141, 196, 199, 35, 161, 154, 95, 78, 187, 158, 62, 71, 120, 10, 130, 134, 180, 81, 7, 14, 114, 149, 156, 35, 85, 106, 95, 100, 30, 75, 114, 74, 183, 157, 175, 49, 183, 74, 171, 37, 190, 55, 191, 143, 163, 56, 140, 177, 67, 171, 63, 46, 125, 11, 27, 63, 20, 71, 150, 162, 124, 51, 110, 116, 9, 158, 158, 26, 171, 77, 11, 107, 135, 142, 27, 9, 50, 184, 64, 56, 142, 137, 169, 142, 66, 65, 82, 125, 69, 30, 77, 182, 99, 192, 16, 135, 98, 95, 81, 142, 167, 82, 175, 159, 109, 91, 91, 108, 70, 112, 22, 124, 13, 171, 76, 14, 18, 29, 74, 93, 63, 31, 131, 175, 162, 66, 57, 106, 156, 17, 146, 39, 17, 116, 40, 138, 25, 158, 102, 137, 151, 122, 111, 172, 175, 10, 129, 157, 61, 57, 98, 153, 123, 138, 25, 117, 58, 73, 136, 173, 165, 50, 112, 75, 171, 160, 189, 164, 179, 47, 172, 183, 188, 164, 106, 137, 173, 140, 102, 195, 178, 3, 194, 158, 89, 96, 37, 10, 100, 109, 133, 57, 102, 75, 131, 34, 115, 135, 119, 196, 187, 110, 109,

 Test	Expected	Got
	159, 79, 184, 95, 122, 111,	159, 79, 184, 95, 122, 111,
	99, 29, 41, 59, 117, 115, 39, 121, 63, 106, 75, 173,	99, 29, 41, 59, 117, 115, 39, 121, 63, 106, 75, 173,
	7, 176, 54, 159, 85, 156,	7, 176, 54, 159, 85, 156,
	125, 2, 57, 4, 66, 185, 84, 114, 65, 94, 197, 175, 176,	125, 2, 57, 4, 66, 185, 84, 114, 65, 94, 197, 175, 176,
	173, 69, 142, 167, 158,	173, 69, 142, 167, 158,
	118, 91, 65, 130, 152, 61,	118, 91, 65, 130, 152, 61,
	27, 96, 93, 2, 195, 152, 23, 162, 115, 127, 78, 198,	27, 96, 93, 2, 195, 152, 23, 162, 115, 127, 78, 198,
	183, 28, 151, 18, 28, 138,	183, 28, 151, 18, 28, 138,
	178, 57, 123, 135, 52, 31,	178, 57, 123, 135, 52, 31,
	100, 4, 86, 133, 183, 149, 187, 168, 104, 28, 64, 26,	100, 4, 86, 133, 183, 149, 187, 168, 104, 28, 64, 26,
	193, 145, 80, 53, 125, 116,	193, 145, 80, 53, 125, 116,
	79, 197, 195, 93, 144, 13,	79, 197, 195, 93, 144, 13, 65, 19, 177, 61, 122, 20,
	65, 19, 177, 61, 122, 20, 199, 50, 57, 93, 4, 158,	199, 50, 57, 93, 4, 158,
	175, 99, 9, 146, 66, 160,	175, 99, 9, 146, 66, 160,
	81, 8, 160, 57, 130, 134, 139, 135, 74, 112, 189,	81, 8, 160, 57, 130, 134, 139, 135, 74, 112, 189,
	108, 48, 52, 183, 17, 33,	108, 48, 52, 183, 17, 33,
	187, 77, 110, 173, 46, 150,	187, 77, 110, 173, 46, 150,
	57, 186, 32, 1, 82, 40, 147, 2, 189, 70, 21, 55,	57, 186, 32, 1, 82, 40, 147, 2, 189, 70, 21, 55,
	97, 164, 196, 124, 185,	97, 164, 196, 124, 185,
	144, 63, 30, 89, 157, 150,	144, 63, 30, 89, 157, 150,
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	63, 58, 154, 116, 88, 115,	63, 58, 154, 116, 88, 115,
	89, 48, 174, 89, 86, 31,	89, 48, 174, 89, 86, 31,
	145, 138, 170, 114, 86, 4, 121, 115, 176, 83, 124, 95,	145, 138, 170, 114, 86, 4, 121, 115, 176, 83, 124, 95,
	74, 20, 111, 35, 125, 129,	74, 20, 111, 35, 125, 129,
	195, 109, 198, 173, 6, 60,	195, 109, 198, 173, 6, 60,
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	35, 109, 67, 52, 19, 159,	35, 109, 67, 52, 19, 159,
	7, 133, 124, 32, 50, 163,	7, 133, 124, 32, 50, 163, 48, 85, 111, 199, 88, 57,
	48, 85, 111, 199, 88, 57, 163, 147, 164, 137, 77, 33,	163, 147, 164, 137, 77, 33,
	79, 33, 25, 117, 21, 184,	79, 33, 25, 117, 21, 184,
	158, 70, 128, 75, 106, 128, 112, 128, 11, 5, 114, 97,	158, 70, 128, 75, 106, 128, 112, 128, 11, 5, 114, 97,
	33, 109, 147, 180, 1, 179,	33, 109, 147, 180, 1, 179,
	21, 128, 147, 41, 162, 82,	21, 128, 147, 41, 162, 82,
	126, 15, 96, 136, 99, 24, 189, 102, 9, 30, 123, 199,	126, 15, 96, 136, 99, 24, 189, 102, 9, 30, 123, 199,
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	111, 40, 30, 186, 31, 33,	111, 40, 30, 186, 31, 33,
	94, 129, 48, 105, 114, 198,	94, 129, 48, 105, 114, 198,
	171, 141, 79, 113, 134, 0, 42, 135, 39, 21, 130, 106,	171, 141, 79, 113, 134, 0, 42, 135, 39, 21, 130, 106,
	96, 111, 179, 104, 52, 94,	96, 111, 179, 104, 52, 94,
	38, 9, 178, 180, 127, 11,	38, 9, 178, 180, 127, 11,
	87, 65, 45, 104, 49, 44, 120, 170, 138, 3, 103, 93,	87, 65, 45, 104, 49, 44, 120, 170, 138, 3, 103, 93,
	19, 84, 88, 118, 98, 36,	19, 84, 88, 118, 98, 36,
	28, 194, 166, 199, 74, 186,	28, 194, 166, 199, 74, 186,
	121, 90, 28, 77, 70, 13, 192, 102, 188, 173, 81, 16,	121, 90, 28, 77, 70, 13, 192, 102, 188, 173, 81, 16,

Test	Expected	Got
	146, 97, 70, 23, 164, 170,	146, 97, 70, 23, 164, 170,
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	39, 84, 104, 93, 179, 40,	39, 84, 104, 93, 179, 40,
	69, 100, 147, 59, 140, 77,	69, 100, 147, 59, 140, 77,
	36, 88, 97, 18, 160, 66, 4,	36, 88, 97, 18, 160, 66, 4,
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	11, 47, 43, 185, 49, 59,	11, 47, 43, 185, 49, 59,
	84, 61, 82, 58, 39, 74,	84, 61, 82, 58, 39, 74,
	194, 112, 171, 30, 126,	194, 112, 171, 30, 126,
	116, 35, 119, 4, 4, 73,	116, 35, 119, 4, 4, 73,
	171, 78, 1, 31, 126, 75,	171, 78, 1, 31, 126, 75,
	148, 10, 115, 152, 145,	148, 10, 115, 152, 145,
	128, 15, 179, 51, 181, 34,	128, 15, 179, 51, 181, 34,
	98, 64, 0, 143, 162, 198,	98, 64, 0, 143, 162, 198,
	180, 141, 59, 134, 21, 38,	180, 141, 59, 134, 21, 38,
	115, 120, 73, 32, 72, 119,	115, 120, 73, 32, 72, 119,
	24, 179, 27, 5, 173, 98,	24, 179, 27, 5, 173, 98,
	98, 162, 22, 21, 86, 161]	98, 162, 22, 21, 86, 161]

int arr[] = {68, 67, 36, 184, 137, 30, 103, 195, 31, 125, 116, 61, 46, 46, 145, 99, 4, 117, 183, 27, 173, 49, 116, 20, 178, 55, 14, 99, 167, 88, 89, 100, 162, 79, 59, 117, 72, 61, 149, 193, 146, 24, 172, 148, 25, 121, 98, 58, 85, 86, 199, 45, 180, 24, 67, 167, 121, 13, 88, 116, 99, 96, 188, 147, 152, 23, 37, 15, 10, 13, 160, 89, 184, 57, 67, 89, 40, 24, 81, 117, 28, 63, 158, 168, 10, 115, 172, 78, 136, 60, 149, 7, 192, 63, 66, 179, 64, 155, 131, 125, 54, 62, 96, 99, 98, 33, 175, 148, 156, 193, 167, 115, 199, 96, 77, 68, 174, 83, 173, 180, 71, 45, 147, 173, 125, 197, 130, 162, 50, 147, 53, 144, 188, 184, 52, 190, 199, 70, 25, 167, 76, 70, 132, 85, 169, 145, 60, 88, 128, 89, 119, 55, 100, 129, 155, 158, 98, 2, 125, 192, 53, 151, 99, 199, 4, 155, 93, 27, 95, 106, 65, 23, 88, 189, 88, 114, 127, 90, 98, 116, 137, 156, 25, 143, 65, 190, 197, 177, 15, 14, 131, 151, 81, 104, 84, 67, 111, 183, 155, 193, 187, 59, 63, 7, 185, 56, 50, 115, 163, 92, 169, 113, 48, 107, 13, 141, 62, 22, 17, 190, 197, 137, 132, 12, 38, 124, 49, 28, 92, 109, 110, 33, 106, 131, 75, 77, 110, 38, 3, 24, 92, 125, 103, 111, 149, 0, 73, 73, 153, 0, 14, 94, 139, 139, 48, 10, 21, 12, 51, 1, 108, 35, 134, 178, 44, 73, 172, 169, 15, 71, 172, 168, 26, 15, 117, 85, 41, 122, 198, 82, 60, 147, 5, 97, 49, 189, 135, 198, 53, 17, 64, 82, 165, 2, 170, 53, 186, 149, 19, 28, 196, 154, 10, 163, 6, 136, 147, 52, 171, 161, 52, 137, 102, 73, 62, 142, 48, 149, 152, 123, 22, 137, 184, 41, 17, 179, 68, 106, 115, 174, 160, 133, 198, 153, 48, 18, 63, 178, 17, 132, 163, 37, 99, 133, 88, 33, 73, 118, 167, 188, 28, 87, 177, 54, 165, 19, 160, 68, 10, 176, 71, 46, 163, 46, 4, 99, 117, 101, 61, 11, 134, 156, 17, 134, 10, 119, 161, 99, 118, 185, 47, 35, 99, 18, 125, 95, 5, 35, 0, 71, 85, 24, 94, 44, 115, 28, 15, 24, 16, 163, 89, 125, 163, 28, 150, 4, 91, 70, 153, 23, 124, 78, 110, 120, 197, 69, 74, 108, 130, 110, 91, 122, 117, 105, 49, 64, 58, 153, 174, 88, 50, 189, 33, 55, 153, 93, 185, 63, 148, 51, 128, 109, 77, 5, 54, 173, 130, 80, 152, 52, 146, 79, 65, 87, 97, 28, 95, 82, 14, 165, 33, 188, 27, 147, 40, 185, 6, 135, 59, 159, 30, 86, 111, 109, 111, 151, 22, 121, 137, 18, 24, 105, 149, 44, 160, 196, 27, 128, 89, 59, 0, 152, 192, 50, 155, 132, 51, 19, 42, 145, 18, 108, 17, 86, 21, 191, 83, 36, 71, 156, 99, 172, 9, 26, 157, 53, 2, 115, 169, 198, 46, 169, 80, 105, 132, 99, 82, 160, 68, 5, 39, 60, 192, 23, 92, 188, 139, 4, 169, 27, 32, 37, 64, 157, 60, 87, 169, 59, 118, 139, 28, 117, 78, 69, 174, 160, 4, 63, 23, 144, 122, 175, 91, 184, 149, 182, 81, 55, 72, 146, 64, 61, 17, 158, 48, 110, 120, 48, 8, 22, 189, 164, 12, 94, 57, 199, 185, 126, 176, 199, 100, 84, 174, 145, 111, 132, 40, 130, 38, 136, 92, 98, 186, 81, 83, 6, 75, 159, 61, 45, 147, 77, 166, 182, 192, 193, 152, 184, 42, 51, 129, 193, 167, 99, 174, 11, 3, 24, 57, 12, 124, 174, 63, 125, 133, 176, 28, 173, 0, 23, 19, 135, 114, 33, 17, 89, 186, 133, 26, 190, 122, 158, 150, 71, 185, 142, 109, 85, 119, 157, 104, 2, 139, 170, 146, 169, 130, 137, 103, 11, 185, 46, 91, 20, 125, 105, 86, 109, 40, 59, 167, 75, 191, 176, 7, 119, 145, 148, 184, 64, 35, 67, 101, 110, 114, 180, 196, 96, 17, 165, 193, 8, 92, 61, 100, 53, 179, 150, 62, 98, 107, 74, 96, 5, 97, 144, 149, 91, 185, 14, 41, 122, 142, 97, 41, 7, 155, 51, 93, 112, 121, 36, 68, 53, 90, 60, 198, 171, 29, 32, 112, 16, 75, 171, 92, 134, 82, 39, 199, 138, 103, 92, 111, 52, 58, 32, 132, 68, 100, 87, 149, 179, 60, 29, 143, 160, 82, 122, 66,

Expected [68, 67, 36, 184, 137, 30, 103, 195, 31, 125, 116, 61, 46, 46, 145, 99, 4, 117, 183, 27, 173, 49, 116, 20, 178, 55, 14, 99, 167, 88, 89, 100, 162, 79, 59, 117, 72, 61, 149, 193, 146, 24, 172, 148, 25, 121, 98, 58, 85, 86, 199, 45, 180, 24, 67, 167, 121, 13, 88, 116, 99, 96, 188, 147, 152, 23, 37, 15, 10, 13, 160, 89, 184, 57, 67, 89, 40, 24, 81, 117, 28, 63, 158, 168, 10, 115, 172, 78, 136, 60, 149, 7, 192, 63, 66, 179, 64, 155, 131, 125, 54, 62, 96, 99, 98, 33, 175, 148, 156, 193, 167, 115, 199, 96, 77, 68, 174, 83, 173, 180, 71, 45, 147, 173, 125, 197, 130, 162, 50, 147, 53, 144, 188, 184, 52, 190, 199, 70, 25, 167, 76, 70, 132, 85, 169, 145, 60, 88, 128, 89, 119, 55, 100, 129, 155, 158, 98, 2, 125, 192, 53, 151, 99, 199, 4, 155, 93, 27, 95, 106, 65, 23, 88, 189, 88, 114, 127, 90, 98, 116, 137, 156, 25, 143, 65, 190, 197, 177, 15, 14, 131, 151, 81, 104, 84, 67, 111, 183, 155, 193, 187, 59, 63, 7, 185, 56, 50, 115, 163, 92, 169, 113, 48, 107, 13, 141, 62, 22, 17, 190, 197, 137, 132, 12, 38, 124, 49, 28, 92, 109, 110, 33, 106, 131, 75, 77, 110, 38, 3, 24, 92, 125, 103, 111, 149, 0, 73, 73, 153, 0, 14, 94, 139, 139, 48, 10, 21, 12, 51, 1, 108, 35, 134, 178, 44, 73, 172, 169, 15, 71, 172, 168, 26, 15, 117, 85, 41, 122, 198, 82, 60, 147, 5, 97, 49, 189, 135, 198, 53, 17, 64, 82, 165, 2, 170, 53, 186, 149, 19, 28, 196, 154, 10, 163, 6, 136, 147, 52, 171, 161, 52, 137, 102, 73, 62, 142, 48, 149, 152, 123, 22, 137, 184, 41, 17, 179, 68, 106, 115, 174, 160, 133, 198, 153, 48, 18, 63, 178, 17, 132, 163, 37, 99, 133, 88, 33, 73, 118, 167, 188, 28, 87, 177, 54, 165, 19, 160, 68, 10, 176, 71, 46, 163, 46, 4, 99, 117, 101, 61, 11, 134, 156, 17, 134, 10, 119, 161, 99, 118, 185, 47, 35, 99, 18, 125, 95, 5, 35, 0, 71, 85, 24, 94, 44, 115, 28, 15, 24, 16, 163, 89, 125, 163, 28, 150, 4, 91, 70, 153, 23, 124, 78, 110, 120, 197, 69, 74, 108, 130, 110, 91, 122, 117, 105, 49,

[68, 67, 36, 184, 137, 30, 103, 195, 31, 125, 116, 61, 46, 46, 145, 99, 4, 117, 183, 27, 173, 49, 116, 20, 178, 55, 14, 99, 167, 88, 89, 100, 162, 79, 59, 117, 72, 61, 149, 193, 146, 24, 172, 148, 25, 121, 98, 58, 85, 86, 199, 45, 180, 24, 67, 167, 121, 13, 88, 116, 99, 96, 188, 147, 152, 23, 37, 15, 10, 13, 160, 89, 184, 57, 67, 89, 40, 24, 81, 117, 28, 63, 158, 168, 10, 115, 172, 78, 136, 60, 149, 7, 192, 63, 66, 179, 64, 155, 131, 125, 54, 62, 96, 99, 98, 33, 175, 148, 156, 193, 167, 115, 199, 96, 77, 68, 174, 83, 173, 180, 71, 45, 147, 173, 125, 197, 130, 162, 50, 147, 53, 144, 188, 184, 52, 190, 199, 70, 25, 167, 76, 70, 132, 85, 169, 145, 60, 88, 128, 89, 119, 55, 100, 129, 155, 158, 98, 2, 125, 192, 53, 151, 99, 199, 4, 155, 93, 27, 95, 106, 65, 23, 88, 189, 88, 114, 127, 90, 98, 116, 137, 156, 25, 143, 65, 190, 197, 177, 15, 14, 131, 151, 81, 104, 84, 67, 111, 183, 155, 193, 187, 59, 63, 7, 185, 56, 50, 115, 163, 92, 169, 113, 48, 107, 13, 141, 62, 22, 17, 190, 197, 137, 132, 12, 38, 124, 49, 28, 92, 109, 110, 33, 106, 131, 75, 77, 110, 38, 3, 24, 92, 125, 103, 111, 149, 0, 73, 73, 153, 0, 14, 94, 139, 139, 48, 10, 21, 12, 51, 1, 108, 35, 134, 178, 44, 73, 172, 169, 15, 71, 172, 168, 26, 15, 117, 85, 41, 122, 198, 82, 60, 147, 5, 97, 49, 189, 135, 198, 53, 17, 64, 82, 165, 2, 170, 53, 186, 149, 19, 28, 196, 154, 10, 163, 6, 136, 147, 52, 171, 161, 52, 137, 102, 73, 62, 142, 48, 149, 152, 123, 22, 137, 184, 41, 17, 179, 68, 106, 115, 174, 160, 133, 198, 153, 48, 18, 63, 178, 17, 132, 163, 37, 99, 133, 88, 33, 73, 118, 167, 188, 28, 87, 177, 54, 165, 19, 160, 68, 10, 176, 71, 46, 163, 46, 4, 99, 117, 101, 61, 11, 134, 156, 17, 134, 10, 119, 161, 99, 118, 185, 47, 35, 99, 18, 125, 95, 5, 35, 0, 71, 85, 24, 94, 44, 115, 28, 15, 24, 16, 163, 89, 125, 163, 28, 150, 4, 91, 70, 153, 23, 124, 78, 110, 120, 197, 69, 74, 108, 130, 110, 91, 122, 117, 105, 49,

20, 52, 86, 149, 16, 136, 165, 131, 93, 0, 180, 157, 12, 172, 93, 122, 199, 45, 95, 156, 31, 94, 186, 5, 136, 32, 169, 42, 114, 174, 88, 79, 170, 38, 160, 195, 120, 185, 65, 14, 97, 132, 160, 40, 128, 0, 18, 99, 49, 159, 87, 11, 167, 49, 97, 61, 175, 158, 183, 134, 99, 108, 54, 173, 67, 67, 71, 20, 81, 119, 135, 107, 148, 6, 11, 38, 104, 131, 90, 89, 12, 106, 111, 136, 44, 181, 167, 75, 168, 46, 176, 34, 164, 134, 107, 181, 177, 141, 147, 136, 52, 107, 30, 37, 157, 174, 108, 90, 187, 13, 125, 172, 7, 13, 48, 52, 198, 177, 26, 9, 34, 56, 91, 166, 187, 130, 55, 94 ...snip..., 140, 0, 165, 198, 69, 114, 198, 102, 64, 18, 136, 191, 30, 160, 46, 144, 111, 11, 184, 36, 24, 72, 91, 192, 146, 51, 177, 153, 128, 84, 139, 147, 184, 3, 61, 76, 198, 158, 177, 90, 190, 146, 6, 66, 81, 17, 9, 131, 177, 116, 181, 50, 16, 105, 143, 144, 198, 142, 53, 25, 138, 135, 193, 30, 43, 123, 89, 117, 39, 118, 25, 86, 115, 195, 42, 18, 92, 136, 44, 96, 62, 151, 18, 168, 51, 121, 37, 147, 198, 6, 116, 10, 80, 163, 186, 54, 171, 83, 185, 8, 62, 105, 102, 99, 176, 156, 164, 87, 176, 44, 190, 110, 132, 141, 87, 172, 0, 129, 180, 35, 42, 91, 157, 164, 52, 9, 23, 101, 49, 137, 165, 31, 76, 152, 65, 151, 157, 94, 133, 40, 45, 30, 183, 167, 44, 13, 61, 79, 41, 25, 44, 190, 74, 44, 176, 40, 116, 136, 31, 138, 173, 21, 86, 137, 24, 18, 65, 84, 66, 49, 125, 119, 83, 133, 16, 138, 70, 40, 83, 138, 20, 160, 126, 142, 125, 129, 53, 156, 41, 170, 138, 109, 127, 145, 19, 6, 156, 151, 46, 153, 94, 100, 90, 155, 105, 90, 47, 111, 170, 29, 49, 163, 154, 78, 185, 138, 53, 12, 149, 98, 163, 84, 33, 78, 47, 50, 45, 118, 22, 25, 48, 93, 123, 167, 158, 84, 73, 93, 127, 190, 159, 69, 128, 68, 59, 116, 77, 137, 160, 99, 95, 16, 90, 120, 162, 125, 156, 130, 59, 185, 176, 102, 176, 58, 183, 179, 40, 138, 41, 53, 69, 95, 103, 16, 103, 163, 126, 98, 83, 21, 39, 38, 75, 192, 134, 102, 104, 74, 31, 113, 61, 55, 40, 70, 190, 119, 195, 104, 152, 118, 138, 146, 147, 194, 120, 37, 166, 194, 181, 7, 146, 149, 2, 118, 81, 9, 6, 182, 96, 37, 136, 135, 171, 169, 143, 106, 16, 92, 94, 117, 63, 86, 131, 101, 64, 39, 51, 4, 190, 136, 150, 116, 74, 193, 49, 170, 50, 146, 123, 102, 172, 6, 119, 139, 182, 37, 180, 114, 72, 9, 10, 35, 12, 139, 22, 38, 116, 95, 87, 166, 157, 101, 66, 88, 99, 81, 163, 196, 30, 149, 173, 161, 195, 54, 116, 141, 165, 100, 153, 117, 141, 54, 85, 81, 56, 174, 114, 100, 32, 176, 78, 11, 30, 193, 97, 12, 150, 85, 49, 73, 147, 33, 44, 181, 85, 171, 151, 70, 72, 135, 28, 99, 32, 91, 184, 120, 25, 85, 182, 192, 195, 115, 150, 67, 46, 156, 147, 0, 82, 61, 68, 19, 107, 38, 64, 43, 27, 30, 95, 22, 64, 44, 14, 102, 79, 168, 91, 24, 65, 97, 171, 169, 190, 193, 161, 36, 159, 126, 23, 19, 48, 113, 193, 26, 125, 76, 160, 50, 36, 184, 181, 4, 148, 37, 119, 155, 84, 46, 46, 104, 64, 139, 193, 16, 23, 168, 45, 161, 128, 175, 70, 197, 126, 130, 91, 94, 98, 155, 165, 98, 48, 71, 89, 97, 108, 80, 23, 181, 7, 3, 137, 112, 20, 2, 167, 173, 136, 90, 194, 160, 130, 175, 169, 183, 159, 78, 113, 93, 160, 83, 15, 141, 136, 109, 187, 52, 73, 47, 5, 26, 135, 32, 75, 10, 47, 141, 79, 71, 192, 181, 122, 57, 147, 62, 101, 121, 112, 78, 162, 42, 34, 101, 14, 185, 195, 1, 194, 134, 186, 73, 186, 90, 84, 46, 126, 163, 0, 14, 87, 31, 120, 19, 92, 118, 77, 36, 21, 138, 19, 195, 95, 123, 45, 111, 106, 198, 17, 194, 55, 142, 63, 189, 55, 102, 198, 99, 104, 150, 48, 108, 16, 196, 175, 195, 119, 12, 96, 98, 120, 27, 71, 147, 88, 1, 35, 154, 67, 37, 187, 90, 163,

Expected 64, 58, 153, 174, 88, 50, 189, 33, 55, 153, 93, 185, 63, 148, 51, 128, 109, 77, 5, 54, 173, 130, 80, 152, 52, 146, 79, 65, 87, 97, 28, 95, 82, 14, 165, 33, 188, 27, 147, 40, 185, 6, 135, 59, 159, 30, 86, 111, 109, 111, 151, 22, 121, 137, 18, 24, 105, 149, 44, 160, 196, 27, 128, 89, 59, 0, 152, 192, 50, 155, 132, 51, 19, 42, 145, 18, 108, 17, 86, 21, 191, 83, 36, 71, 156, 99, 172, 9, 26, 157, 53, 2, 115, 169, 198, 46, 169, 80, 105, 132, 99, 82, 160, 68, 5, 39, 60, 192, 23, 92, 188, 139, 4, 169, 27, 32, 37, 64, 157, 60, 87, 169, 59, 118, 139, 28, 117, 78, 69, 174, 160, 4, 63, 23, 144, 122, 175, 91, 184, 149, 182, 81, 55, 72, 146, 64, 61, 17, 158, 48, 110, 120, 48, 8, 22, 189, 164, 12, 94, 57, 199, 185, 126, 176, 199, 100, 84, 174, 145, 111, 132, 40, 130, 38, 136, 92, 98, 186, 81, 83, 6, 75, 159, 61, 45, 147, 77, 166, 182, 192, 193, 152, 184, 42, 51, 129, 193, 167, 99, 174, 11, 3, 24, 57, 12, 124, 174, 63, 125, 133, 176, 28, 173, 0, 23, 19, 135, 114, 33, 17, 89, 186, 133, 26, 190, 122, 158, 150, 71, 185, 142, 109, 85, 119, 157, 104, 2, 139, 170, 146, 169, 130, 137, 103, 11, 185, 46, 91, 20, 125, 105, 86, 109, 40, 59, 167, 75, 191, 176, 7, 119, 145, 148, 184, 64, 35, 67, 101, 110, 114, 180, 196, 96, 17, 165, 193, 8, 92, 61, 100, 53, 179, 150, 62, 98, 107, 74, 96, 5, 97, 144, 149, 91, 185, 14, 41, 122, 142, 97, 41, 7, 155, 51, 93, 112, 121, 36, 68, 53, 90, 60, 198, 171, 29, 32, 112, 16, 75, 171, 92, 134, 82, 39, 199, 138, 103, 92, 111, 52, 58, 32, 132, 68, 100, 87, 149, 179, 60, 29, 143, 160, 82, 122, 66, 20, 52, 86, 149, 16, 136, 165, 131, 93, 0, 180, 157, 12, 172, 93, 122, 199, 45, 95, 156, 31, 94, 186, 5, 136, 32, 169, 42, 114, 174, 88, 79, 170, 38, 160, 195, 120, 185, 65, 14, 97, 132, 160, 40, 128, 0, 18, 99, 49, 159, 87, 11, 167, 49, 97, 61, 175, 158, 183, 134, 99, 108, 54, 173, 67, 67, 71, 20, 81, 119, 135, 107,

148, 6, 11, 38, 104, 131,

64, 58, 153, 174, 88, 50, 189, 33, 55, 153, 93, 185, 63, 148, 51, 128, 109, 77, 5, 54, 173, 130, 80, 152, 52, 146, 79, 65, 87, 97, 28, 95, 82, 14, 165, 33, 188, 27, 147, 40, 185, 6, 135, 59, 159, 30, 86, 111, 109, 111, 151, 22, 121, 137, 18, 24, 105, 149, 44, 160, 196, 27, 128, 89, 59, 0, 152, 192, 50, 155, 132, 51, 19, 42, 145, 18, 108, 17, 86, 21, 191, 83, 36, 71, 156, 99, 172, 9, 26, 157, 53, 2, 115, 169, 198, 46, 169, 80, 105, 132, 99, 82, 160, 68, 5, 39, 60, 192, 23, 92, 188, 139, 4, 169, 27, 32, 37, 64, 157, 60, 87, 169, 59, 118, 139, 28, 117, 78, 69, 174, 160, 4, 63, 23, 144, 122, 175, 91, 184, 149, 182, 81, 55, 72, 146, 64, 61, 17, 158, 48, 110, 120, 48, 8, 22, 189, 164, 12, 94, 57, 199, 185, 126, 176, 199, 100, 84, 174, 145, 111, 132, 40, 130, 38, 136, 92, 98, 186, 81, 83, 6, 75, 159, 61, 45, 147, 77, 166, 182, 192, 193, 152, 184, 42, 51, 129, 193, 167, 99, 174, 11, 3, 24, 57, 12, 124, 174, 63, 125, 133, 176, 28, 173, 0, 23, 19, 135, 114, 33, 17, 89, 186, 133, 26, 190, 122, 158, 150, 71, 185, 142, 109, 85, 119, 157, 104, 2, 139, 170, 146, 169, 130, 137, 103, 11, 185, 46, 91, 20, 125, 105, 86, 109, 40, 59, 167, 75, 191, 176, 7, 119, 145, 148, 184, 64, 35, 67, 101, 110, 114, 180, 196, 96, 17, 165, 193, 8, 92, 61, 100, 53, 179, 150, 62, 98, 107, 74, 96, 5, 97, 144, 149, 91, 185, 14, 41, 122, 142, 97, 41, 7, 155, 51, 93, 112, 121, 36, 68, 53, 90, 60, 198, 171, 29. 32, 112, 16, 75, 171, 92, 134, 82, 39, 199, 138, 103, 92, 111, 52, 58, 32, 132, 68, 100, 87, 149, 179, 60, 29, 143, 160, 82, 122, 66, 20, 52, 86, 149, 16, 136, 165, 131, 93, 0, 180, 157, 12, 172, 93, 122, 199, 45, 95, 156, 31, 94, 186, 5, 136, 32, 169, 42, 114, 174, 88, 79, 170, 38, 160, 195, 120, 185, 65, 14, 97, 132, 160, 40, 128, 0, 18, 99, 49, 159, 87, 11, 167, 49, 97, 61, 175, 158, 183, 134, 99, 108, 54, 173, 67, 67, 71, 20, 81, 119, 135, 107, 148, 6, 11, 38, 104, 131,

21, 105, 165, 2, 14, 86, 1, 114, 81, 102, 79, 98, 7, 141, 117, 44, 190, 123, 182, 157, 132, 20, 64, 5, 11, 187, 167, 112, 118, 88, 136, 164, 19, 151, 0, 187, 65, 179, 6, 43, 148, 154, 111, 197, 119, 131, 73, 123, 1, 54, 185, 93, 156, 83, 129, 62, 161, 133, 84, 58, 144, 128, 196, 58, 95, 89, 158, 76, 88, 5, 188, 5, 80, 173, 156, 48, 85, 184, 166, 100, 176, 33, 140, 96, 27, 66, 69, 194, 37, 146, 107, 161, 11, 11, 150, 135, 145, 183, 135, 3, 106, 124, 34, 158, 149, 37, 134, 61, 112, 100, 54, 70, 81, 181, 141, 134, 130, 44, 30, 26, 29, 145, 2, 45, 9, 138, 158, 97, 43, 10, 195, 106, 32, 121, 111, 55, 98, 141, 93, 74, 33, 111, 105, 18, 124, 128, 86, 79, 41, 14, 75, 198, 33, 162, 171, 101, 111, 100, 132, 42, 98, 25, 98, 23, 169, 140, 109, 96, 111, 18, 81, 0, 104, 74, 37, 81, 90, 21, 166, 106, 191, 170, 44, 6, 90, 174, 44, 195, 88, 154, 64, 112, 33, 61, 141, 98, 14, 91, 59, 137, 150, 118, 114, 55, 36, 108, 83, 144}; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = reverseLinkedList(head);

LLNode::printList(newhead);

newhead->clear();

Expected

90, 89, 12, 106, 111, 136, 44, 181, 167, 75, 168, 46, 176, 34, 164, 134, 107, 181, 177, 141, 147, 136, 52, 107, 30, 37, 157, 174, 108, 90, 187, 13, 125, 172, 7, 13, 48, 52, 198, 177, 26, 9, 34, 56, 91, 166, 187, 130, 55, 94, 178, 10, 1 ...snip... , 10, 178, 94, 55, 130, 187, 166, 91, 56, 34, 9, 26, 177, 198, 52, 48, 13, 7, 172, 125, 13, 187, 90, 108, 174, 157, 37, 30, 107, 52, 136, 147, 141, 177, 181, 107, 134, 164, 34, 176, 46, 168, 75, 167, 181, 44, 136, 111, 106, 12, 89, 90, 131, 104, 38, 11, 6, 148, 107, 135, 119, 81, 20, 71, 67, 67, 173, 54, 108, 99, 134, 183, 158, 175, 61, 97, 49, 167, 11, 87, 159, 49, 99, 18, 0, 128, 40, 160, 132, 97, 14, 65, 185, 120, 195, 160, 38, 170, 79, 88, 174, 114, 42, 169, 32, 136, 5, 186, 94, 31, 156, 95, 45, 199, 122, 93, 172, 12, 157, 180, 0, 93, 131, 165, 136, 16, 149, 86, 52, 20, 66, 122, 82, 160, 143, 29, 60, 179, 149, 87, 100, 68, 132, 32, 58, 52, 111, 92, 103, 138, 199, 39, 82, 134, 92, 171, 75, 16, 112, 32, 29, 171, 198, 60, 90, 53, 68, 36, 121, 112, 93, 51, 155, 7, 41, 97, 142, 122, 41, 14, 185, 91, 149, 144, 97, 5, 96, 74, 107, 98, 62, 150, 179, 53, 100, 61, 92, 8, 193, 165, 17, 96, 196, 180, 114, 110, 101, 67, 35, 64, 184, 148, 145, 119, 7, 176, 191, 75, 167, 59, 40, 109, 86, 105, 125, 20, 91, 46, 185, 11, 103, 137, 130, 169, 146, 170, 139, 2, 104, 157, 119, 85, 109, 142, 185, 71, 150, 158, 122, 190, 26, 133, 186, 89, 17, 33, 114, 135, 19, 23, 0, 173, 28, 176, 133, 125, 63, 174, 124, 12, 57, 24, 3, 11, 174, 99, 167, 193, 129, 51, 42, 184, 152, 193, 192, 182, 166, 77, 147, 45, 61, 159, 75, 6, 83, 81, 186, 98, 92, 136, 38, 130, 40, 132, 111, 145, 174, 84, 100, 199, 176, 126, 185, 199, 57, 94, 12, 164, 189, 22, 8, 48, 120, 110, 48, 158, 17, 61, 64, 146, 72, 55, 81, 182, 149, 184, 91, 175, 122, 144, 23, 63, 4, 160, 174, 69, 78, 117, 28, 139, 118, 59, 169, 87, 60,

157, 64, 37, 32, 27, 169,

Got

90, 89, 12, 106, 111, 136, 44, 181, 167, 75, 168, 46, 176, 34, 164, 134, 107, 181, 177, 141, 147, 136, 52, 107, 30, 37, 157, 174, 108, 90, 187, 13, 125, 172, 7, 13, 48, 52, 198, 177, 26, 9, 34, 56, 91, 166, 187, 130, 55, 94, 178, 10, 1 ...snip..., 10, 178, 94, 55, 130, 187, 166, 91, 56, 34, 9, 26, 177, 198, 52, 48, 13, 7, 172, 125, 13, 187, 90, 108, 174, 157, 37, 30, 107, 52, 136, 147, 141, 177, 181, 107, 134, 164, 34, 176, 46, 168, 75, 167, 181, 44, 136, 111, 106, 12, 89, 90, 131, 104, 38, 11, 6, 148, 107, 135, 119, 81, 20, 71, 67, 67, 173, 54, 108, 99, 134, 183, 158, 175, 61, 97, 49, 167, 11, 87, 159, 49, 99, 18, 0, 128, 40, 160, 132, 97, 14, 65, 185, 120, 195, 160, 38, 170, 79, 88, 174, 114, 42, 169, 32, 136, 5, 186, 94, 31, 156, 95, 45, 199, 122, 93, 172, 12, 157, 180, 0, 93, 131, 165, 136, 16, 149, 86, 52, 20, 66, 122, 82, 160, 143, 29, 60, 179, 149, 87, 100, 68, 132, 32, 58, 52, 111, 92, 103, 138, 199, 39, 82, 134, 92, 171, 75, 16, 112, 32, 29, 171, 198, 60, 90, 53, 68, 36, 121, 112, 93, 51, 155, 7, 41, 97, 142, 122, 41, 14, 185, 91, 149, 144, 97, 5, 96, 74, 107, 98, 62, 150, 179, 53, 100, 61, 92, 8, 193, 165, 17, 96, 196, 180, 114, 110, 101, 67, 35, 64, 184, 148, 145, 119, 7, 176, 191, 75, 167, 59, 40, 109, 86, 105, 125, 20, 91, 46, 185, 11, 103, 137, 130, 169, 146, 170, 139, 2, 104, 157, 119, 85, 109, 142, 185, 71, 150, 158, 122, 190, 26, 133, 186, 89, 17, 33, 114, 135, 19, 23, 0, 173, 28, 176, 133, 125, 63, 174, 124, 12, 57, 24, 3, 11, 174, 99, 167, 193, 129, 51, 42, 184, 152, 193, 192, 182, 166, 77, 147, 45, 61, 159, 75, 6, 83, 81, 186, 98, 92, 136, 38, 130, 40, 132, 111, 145, 174, 84, 100, 199, 176, 126, 185, 199, 57, 94, 12, 164, 189, 22, 8, 48, 120, 110, 48, 158, 17, 61, 64, 146, 72, 55, 81, 182, 149, 184, 91, 175, 122, 144, 23, 63, 4, 160, 174, 69, 78, 117, 28, 139, 118, 59, 169, 87, 60, 157, 64, 37, 32, 27, 169,

Test	Expected	Got
	4, 139, 188, 92, 23, 192,	4, 139, 188, 92, 23, 192,
	60, 39, 5, 68, 160, 82, 99, 132, 105, 80, 169, 46, 198,	60, 39, 5, 68, 160, 82, 99, 132, 105, 80, 169, 46, 198,
	169, 115, 2, 53, 157, 26,	169, 115, 2, 53, 157, 26,
	9, 172, 99, 156, 71, 36,	9, 172, 99, 156, 71, 36,
	83, 191, 21, 86, 17, 108,	83, 191, 21, 86, 17, 108,
	18, 145, 42, 19, 51, 132, 155, 50, 192, 152, 0, 59,	18, 145, 42, 19, 51, 132, 155, 50, 192, 152, 0, 59,
	89, 128, 27, 196, 160, 44,	89, 128, 27, 196, 160, 44,
	149, 105, 24, 18, 137, 121,	149, 105, 24, 18, 137, 121,
	22, 151, 111, 109, 111, 86,	22, 151, 111, 109, 111, 86,
	30, 159, 59, 135, 6, 185, 40, 147, 27, 188, 33, 165,	30, 159, 59, 135, 6, 185, 40, 147, 27, 188, 33, 165,
	14, 82, 95, 28, 97, 87, 65,	14, 82, 95, 28, 97, 87, 65,
	79, 146, 52, 152, 80, 130,	79, 146, 52, 152, 80, 130,
	173, 54, 5, 77, 109, 128,	173, 54, 5, 77, 109, 128,
	51, 148, 63, 185, 93, 153, 55, 33, 189, 50, 88, 174,	51, 148, 63, 185, 93, 153, 55, 33, 189, 50, 88, 174,
	153, 58, 64, 49, 105, 117,	153, 58, 64, 49, 105, 117,
	122, 91, 110, 130, 108, 74,	122, 91, 110, 130, 108, 74,
	69, 197, 120, 110, 78, 124,	69, 197, 120, 110, 78, 124,
	23, 153, 70, 91, 4, 150, 28, 163, 125, 89, 163, 16,	23, 153, 70, 91, 4, 150, 28, 163, 125, 89, 163, 16,
	24, 15, 28, 115, 44, 94,	24, 15, 28, 115, 44, 94,
	24, 85, 71, 0, 35, 5, 95,	24, 85, 71, 0, 35, 5, 95,
	125, 18, 99, 35, 47, 185,	125, 18, 99, 35, 47, 185,
	118, 99, 161, 119, 10, 134, 17, 156, 134, 11, 61, 101,	118, 99, 161, 119, 10, 134, 17, 156, 134, 11, 61, 101,
	117, 99, 4, 46, 163, 46,	117, 99, 4, 46, 163, 46,
	71, 176, 10, 68, 160, 19,	71, 176, 10, 68, 160, 19,
	165, 54, 177, 87, 28, 188,	165, 54, 177, 87, 28, 188,
	167, 118, 73, 33, 88, 133, 99, 37, 163, 132, 17, 178,	167, 118, 73, 33, 88, 133, 99, 37, 163, 132, 17, 178,
	63, 18, 48, 153, 198, 133,	63, 18, 48, 153, 198, 133,
	160, 174, 115, 106, 68,	160, 174, 115, 106, 68,
	179, 17, 41, 184, 137, 22,	179, 17, 41, 184, 137, 22,
	123, 152, 149, 48, 142, 62, 73, 102, 137, 52, 161, 171,	123, 152, 149, 48, 142, 62, 73, 102, 137, 52, 161, 171,
	52, 147, 136, 6, 163, 10,	52, 147, 136, 6, 163, 10,
	154, 196, 28, 19, 149, 186,	154, 196, 28, 19, 149, 186,
	53, 170, 2, 165, 82, 64,	53, 170, 2, 165, 82, 64,
	17, 53, 198, 135, 189, 49, 97, 5, 147, 60, 82, 198,	17, 53, 198, 135, 189, 49, 97, 5, 147, 60, 82, 198,
	122, 41, 85, 117, 15, 26,	122, 41, 85, 117, 15, 26,
	168, 172, 71, 15, 169, 172,	168, 172, 71, 15, 169, 172,
	73, 44, 178, 134, 35, 108,	73, 44, 178, 134, 35, 108,
	1, 51, 12, 21, 10, 48, 139, 139, 94, 14, 0, 153, 73,	1, 51, 12, 21, 10, 48, 139, 139, 94, 14, 0, 153, 73,
	73, 0, 149, 111, 103, 125,	73, 0, 149, 111, 103, 125,
	92, 24, 3, 38, 110, 77, 75,	92, 24, 3, 38, 110, 77, 75,
	131, 106, 33, 110, 109, 92,	131, 106, 33, 110, 109, 92,
	28, 49, 124, 38, 12, 132, 137, 197, 190, 17, 22, 62,	28, 49, 124, 38, 12, 132, 137, 197, 190, 17, 22, 62,
	141, 13, 107, 48, 113, 169,	141, 13, 107, 48, 113, 169,
	92, 163, 115, 50, 56, 185,	92, 163, 115, 50, 56, 185,
	7, 63, 59, 187, 193, 155,	7, 63, 59, 187, 193, 155,
	183, 111, 67, 84, 104, 81, 151, 131, 14, 15, 177, 197,	183, 111, 67, 84, 104, 81, 151, 131, 14, 15, 177, 197,
	190, 65, 143, 25, 156, 137,	190, 65, 143, 25, 156, 137,
	116, 98, 90, 127, 114, 88,	116, 98, 90, 127, 114, 88,
	189, 88, 23, 65, 106, 95,	189, 88, 23, 65, 106, 95,
	27, 93, 155, 4, 199, 99, 151, 53, 192, 125, 2, 98,	27, 93, 155, 4, 199, 99, 151, 53, 192, 125, 2, 98,
	158, 155, 129, 100, 55,	158, 155, 129, 100, 55,
	119, 89, 128, 88, 60, 145,	119, 89, 128, 88, 60, 145,
	169, 85, 132, 70, 76, 167,	169, 85, 132, 70, 76, 167,
	25, 70, 199, 190, 52, 184, 188, 144, 53, 147, 50, 162,	25, 70, 199, 190, 52, 184, 188, 144, 53, 147, 50, 162,
	130, 197, 125, 173, 147,	130, 197, 125, 173, 147,
	45, 71, 180, 173, 83, 174,	45, 71, 180, 173, 83, 174,

Test	Expected	Got
	193, 156, 148, 175, 33, 98,	193, 156, 148, 175, 33, 98,
	99, 96, 62, 54, 125, 131,	99, 96, 62, 54, 125, 131,
	155, 64, 179, 66, 63, 192,	155, 64, 179, 66, 63, 192,
	7, 149, 60, 136, 78, 172,	7, 149, 60, 136, 78, 172,
	115, 10, 168, 158, 63, 28,	115, 10, 168, 158, 63, 28,
	117, 81, 24, 40, 89, 67,	117, 81, 24, 40, 89, 67,
	57, 184, 89, 160, 13, 10,	57, 184, 89, 160, 13, 10,
	15, 37, 23, 152, 147, 188,	15, 37, 23, 152, 147, 188,
	96, 99, 116, 88, 13, 121,	96, 99, 116, 88, 13, 121,
	167, 67, 24, 180, 45, 199,	167, 67, 24, 180, 45, 199,
	86, 85, 58, 98, 121, 25,	86, 85, 58, 98, 121, 25,
	148, 172, 24, 146, 193,	148, 172, 24, 146, 193,
	149, 61, 72, 117, 59, 79,	149, 61, 72, 117, 59, 79,
	162, 100, 89, 88, 167, 99,	162, 100, 89, 88, 167, 99,
	14, 55, 178, 20, 116, 49,	14, 55, 178, 20, 116, 49,
	173, 27, 183, 117, 4, 99,	173, 27, 183, 117, 4, 99,
	145, 46, 46, 61, 116, 125,	145, 46, 46, 61, 116, 125,
	31, 195, 103, 30, 137, 184,	31, 195, 103, 30, 137, 184,
	36, 67, 68]	36, 67, 68]

Passed all tests! 🗸



Đúng) Marks for this submission: 1,00/1,00.

```
Câu hởi 5
Đúng
Đạt điểm 1,00 trên 1,00
```

Class LLNode is used to store a node in a singly linked list, described on the following:

```
class LLNode {
   public:
      int val;
      LLNode* next;
      LLNode();
      LLNode(int val, LLNode* next);
}
```

Where val is the value of node, next is the pointer to the next node.

Request: Implement function:

```
LLNode* addLinkedList(LLNode* 10, LLNode* 11);
```

Where 10, 11 are two linked lists represented positive integers, each node is a digit, the head is the least significant digit (the value of each node is between 0 and 9, the length of each linked list is between 0 and 100000). This function returns the linked list representing the sum of the two integers.

Example:

```
Given 10 = [2, 3] (representing 32) and 11 = [1, 8] (representing 81). The result would be 10 = [3, 1, 1] (representing 32 + 8] = 113).
```

Note:

In this exercise, the libraries iostream, string, cstring, climits, utility, vector, list, stack, queue, map, unordered_map, set, unordered_set, functional, algorithm has been included and namespace std are used. You can write helper functions and classes. Importing other libraries is allowed, but not encouraged, and may result in unexpected errors.

For example:

Test	Result
int arr1[] = {2, 9};	[2, 4, 1]
int arr2[] = {0, 5};	
<pre>LLNode* head1 = LLNode::createWithIterators(arr1, arr1 + sizeof(arr1) / sizeof(int));</pre>	
LLNode* head2 = LLNode::createWithIterators(arr2, arr2 + sizeof(arr2) / sizeof(int));	
<pre>LLNode* newhead = addLinkedList(head1, head2);</pre>	
LLNode::printList(newhead);	
head1->clear();	
head2->clear();	
<pre>newhead->clear();</pre>	

Answer: (penalty regime: 0, 0, 0, 5, 10, ... %)

Reset answer

```
1 LLNode* addLinkedList(LLNode* 10, LLNode* 11) {
        LLNode* dummyHead = new LLNode(0, nullptr); // Dummy head t
 2
 3
        LLNode* current = dummyHead;
 4
        int carry = 0;
 5
 6
        while (10 || 11 || carry) {
 7
            int sum = carry;
            if (10) {
8
 9
                sum += 10->val;
10
                10 = 10->next;
11
            if (11) {
12
13
                sum += l1->val;
                11 = 11->next;
14
15
16
17
            carry = sum / 10;
18
            current->next = new LLNode(sum % 10, nullptr);
19
            current = current->next;
20
        }
21
22
        LLNode* result = dummyHead->next;
```

dalata dummyHaad. // Eraa dummy nada

```
return result;

}
26 |
```

	Test	Expected	Got	
~	<pre>int arr1[] = {2, 9}; int arr2[] = {0, 5}; LLNode* head1 = LLNode::createWithIterators(arr1, arr1 + sizeof(arr1) / sizeof(int)); LLNode* head2 = LLNode::createWithIterators(arr2, arr2 + sizeof(arr2) / sizeof(int)); LLNode* newhead = addLinkedList(head1, head2); LLNode::printList(newhead); head1->clear(); head2->clear(); newhead->clear();</pre>	[2, 4, 1]	[2, 4, 1]	~

Passed all tests! 🗸



Marks for this submission: 1,00/1,00.

1.

```
Câu hỏi ố
Đúng
Đạt điểm 1,00 trên 1,00
```

Class LLNode representing a node of singly linked lists is declared as below:

```
class LLNode {
public:
    int val;
    LLNode* next;
    LLNode(); // Constructor: val = 0, next = nullptr
    LLNode(int val, LLNode* next); // Constructor with customized data
}
```

Given a singly linked list head node and a integer k.

Your task is to implement a function with following prototype:

```
LLNode* rotateLinkedList(LLNode* head, int k);
```

The function returns head node of the rotated singly linked list obtained after rotate the linked list to the right by k places.

Note

- The iostream library has been used and namespace std is being used. No other libraries are allowed.
- The constructors and methods of class LLNode have been defined fully so you do not need to redefine them.
- You can write helper functions.

For example:

Test	Result
<pre>int arr[] = {2, 4, 6, 6, 3}; int k = 3; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	[2, 4, 6, 6, 3] [6, 6, 3, 2, 4]

Answer: (penalty regime: 0 %)

Reset answer

```
1 | LLNode* rotateLinkedList(LLNode* head, int k) {
        if (!head || !head->next || k == 0) return head;
 2
 3
        // Step 1: Compute the length of the list
4
 5
        int length = 1;
6
        LLNode* tail = head;
7
        while (tail->next) {
            tail = tail->next;
8
9
            length++;
10
        }
11
        // Step 2: Compute effective rotations (k might be larger than length)
12
13
        k = k % length;
14
        if (k == 0) return head; // No rotation needed
15
16
        // Step 3: Find new head (length - k)th node
17
        int stepsToNewHead = length - k;
18
        LLNode* newTail = head;
        for (int i = 1; i < stepsToNewHead; i++) {</pre>
19
            newTail = newTail->next;
20
21
22
        // Step 4: Update pointers to rotate the list
23
24
        LLNode* newHead = newTail->next;
25
        newTail->next = nullptr;
26
        tail->next = head;
27
28
        return newHead;
29
    }
30
```

	Test	Expected	Got	
~	<pre>int arr[] = {2, 4, 6, 6, 3}; int k = 3; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	[2, 4, 6, 6, 3] [6, 6, 3, 2, 4]	[2, 4, 6, 6, 3] [6, 6, 3, 2, 4]	~
~	<pre>int arr[] = {}; int k = 2; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	[]		~
~	<pre>int arr[] = {0, 4, 2, 5, 1, 0, 6, 4, 8, 6}; int k = 11; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	[0, 4, 2, 5, 1, 0, 6, 4, 8, 6] [6, 0, 4, 2, 5, 1, 0, 6, 4, 8]	[0, 4, 2, 5, 1, 0, 6, 4, 8, 6] [6, 0, 4, 2, 5, 1, 0, 6, 4, 8]	~
~	<pre>int arr[] = {6, 1, 3, 2, 6, 0, 0, 0, 3, 3, 9, 8, 5, 6, 0, 7, 7, 8, 5, 7, 7, 9, 6, 3, 3, 0, 0, 8, 0, 0, 4, 9, 7, 1, 7, 2, 7, 5, 4, 4, 7, 5, 9, 2, 4, 5, 7, 9, 7, 9, 7, 2, 0, 6, 7, 6, 5, 1, 9, 7, 1, 2, 7, 8, 7, 5, 4, 7, 6, 9, 0, 2, 7, 0, 5, 5, 6, 8, 3, 1, 9, 3, 0, 1, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 0, 7, 3, 5, 2, 9, 1, 0, 9}; int k = 35; LLNode* head = LLNode::createWithIterators(arr, arr + sizeof(arr) / sizeof(int)); LLNode::printList(head); cout << "\n"; LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	[6, 1, 3, 2, 6, 0, 0, 0, 3, 3, 9, 8, 5, 6, 0, 7, 7, 8, 5, 7, 7, 9, 6, 3, 3, 0, 0, 8, 0, 0, 4, 9, 7, 1, 7, 2, 7, 5, 4, 4, 7, 5, 9, 2, 4, 5, 7, 9, 7, 9, 7, 1, 2, 7, 8, 7, 5, 4, 7, 6, 9, 0, 2, 7, 0, 5, 5, 6, 8, 3, 1, 9, 3, 0, 1, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 0, 7, 3, 5, 2, 9, 1, 0, 9] [0, 2, 7, 0, 5, 5, 6, 8, 3, 1, 9, 3, 0, 1, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 0, 7, 3, 5, 2, 9, 1, 0, 9, 6, 1, 3, 2, 6, 0, 0, 0, 3, 3, 9, 8, 5, 6, 0, 7, 7, 8, 5, 7, 7, 9, 6, 3, 3, 0, 0, 8, 0, 0, 4, 9, 7, 1, 7, 2, 7, 5, 4, 4, 7, 5, 9, 2, 4, 5, 7, 9, 7, 9, 7, 2, 0, 6, 7, 6, 5, 1, 9, 7, 1, 2, 7, 8, 7, 5, 4, 7, 6, 9]	[6, 1, 3, 2, 6, 0, 0, 0, 3, 3, 3, 9, 8, 5, 6, 0, 7, 7, 8, 5, 7, 7, 9, 6, 3, 3, 0, 0, 8, 0, 0, 4, 9, 7, 1, 7, 2, 7, 5, 4, 4, 7, 5, 9, 2, 4, 5, 7, 9, 7, 9, 7, 1, 2, 7, 8, 7, 5, 4, 7, 6, 9, 0, 2, 7, 0, 5, 5, 6, 8, 3, 1, 9, 3, 0, 1, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 0, 7, 3, 5, 2, 9, 1, 0, 9] [0, 2, 7, 0, 5, 5, 6, 8, 3, 1, 9, 3, 0, 1, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 6, 9, 2, 2, 0, 6, 7, 4, 4, 6, 0, 7, 3, 5, 2, 9, 1, 0, 9, 6, 1, 3, 2, 6, 0, 0, 0, 3, 3, 9, 8, 5, 6, 0, 7, 7, 8, 5, 7, 7, 9, 6, 3, 3, 0, 0, 8, 0, 0, 4, 9, 7, 1, 7, 2, 7, 5, 4, 4, 7, 5, 9, 2, 4, 5, 7, 9, 7, 9, 7, 2, 0, 6, 7, 6, 5, 1, 9, 7, 1, 2, 7, 8, 7, 5, 4, 7, 6, 9]	~

Test	Expected	Got	
int arr[] = {9, 1, 7, 5, 8, 6, 2, 2, 2, 6, 0, 8,	[9, 1, 7, 5, 8, 6, 2, 2, 2,	[9, 1, 7, 5, 8, 6, 2, 2, 2,	\
1, 9, 6, 8, 4, 8, 4, 3, 7, 0, 7, 8, 9, 5, 3, 4,	6, 0, 8, 1, 9, 6, 8, 4, 8,	6, 0, 8, 1, 9, 6, 8, 4, 8,	`
7, 4, 3, 5, 2, 2, 7, 8, 9, 7, 1, 9, 9, 8, 3, 5,	4, 3, 7, 0, 7, 8, 9, 5, 3,	4, 3, 7, 0, 7, 8, 9, 5, 3,	
7, 1, 6, 9, 1, 2, 0, 6, 8, 0, 4, 1, 6, 5, 8, 7,	4, 7, 4, 3, 5, 2, 2, 7, 8,	4, 7, 4, 3, 5, 2, 2, 7, 8,	
6, 8, 0, 5, 7, 8, 8, 6, 7, 5, 8, 0, 7, 6, 4, 9,	9, 7, 1, 9, 9, 8, 3, 5, 7,	9, 7, 1, 9, 9, 8, 3, 5, 7,	
5, 9, 6, 4, 1, 5, 6, 2, 2, 6, 7, 0, 3, 4, 2, 3,	1, 6, 9, 1, 2, 0, 6, 8, 0,	1, 6, 9, 1, 2, 0, 6, 8, 0,	
9, 0, 9, 6, 3, 6, 7, 5, 5, 5, 9, 0, 6, 1, 1, 5,	4, 1, 6, 5, 8, 7, 6, 8, 0,	4, 1, 6, 5, 8, 7, 6, 8, 0,	
0, 9, 1, 1, 1, 0, 4, 6, 3, 3, 3, 5, 8, 7, 4, 7,	5, 7, 8, 8, 6, 7, 5, 8, 0,	5, 7, 8, 8, 6, 7, 5, 8, 0,	
1, 7, 1, 8, 4, 2, 0, 1, 9, 0, 7, 9, 2, 8, 9, 2,	7, 6, 4, 9, 5, 9, 6, 4, 1,	7, 6, 4, 9, 5, 9, 6, 4, 1,	
5, 3, 5, 9, 3, 2, 7, 3, 5, 9, 5, 5, 3, 2, 3, 9,	5, 6, 2, 2, 6, 7, 0, 3, 4,	5, 6, 2, 2, 6, 7, 0, 3, 4,	
4, 1, 6, 1, 8, 3, 1, 4, 5, 2, 5, 7, 7, 0, 9, 6,	2, 3, 9, 0, 9, 6, 3, 6, 7,	2, 3, 9, 0, 9, 6, 3, 6, 7,	
6, 4, 8, 1, 1, 6, 0, 2, 6, 0, 7, 5, 5, 0, 5, 2,	5, 5, 5, 9, 0, 6, 1, 1, 5,	5, 5, 5, 9, 0, 6, 1, 1, 5,	
6, 9, 9, 9, 9, 2, 3, 0, 6, 8, 8, 4, 5, 6, 2, 8,	0, 9, 1, 1, 1, 0, 4, 6, 3,	0, 9, 1, 1, 1, 0, 4, 6, 3,	
5, 9, 8, 3, 6, 8, 8, 6, 2, 1, 2, 1, 4, 6, 2, 0,	3, 3, 5, 8, 7, 4, 7, 1, 7,	3, 3, 5, 8, 7, 4, 7, 1, 7,	
9, 3, 9, 6, 4, 2, 3, 6, 2, 0, 9, 8, 7, 0, 6, 0,	1, 8, 4, 2, 0, 1, 9, 0, 7,	1, 8, 4, 2, 0, 1, 9, 0, 7,	
7, 0, 5, 9, 4, 3, 7, 9, 7, 3, 5, 7, 0, 3, 1, 8, 9, 9, 4, 0, 8, 6, 4, 6, 7, 3, 8, 1, 2, 1, 5, 4,	9, 2, 8, 9, 2, 5, 3, 5, 9, 3, 2, 7, 3, 5, 9, 5, 5, 3,	9, 2, 8, 9, 2, 5, 3, 5, 9,	
9, 5, 9, 5, 8, 6, 6, 8, 9, 4, 4, 0, 6, 4, 5, 3,	2, 3, 9, 4, 1, 6, 1, 8, 3,	3, 2, 7, 3, 5, 9, 5, 5, 3, 2, 3, 9, 4, 1, 6, 1, 8, 3,	
0, 3, 9, 7, 1, 7, 2, 5, 0, 1, 9, 1, 2, 5, 6, 8,	1, 4, 5, 2, 5, 7, 7, 0, 9,	1, 4, 5, 2, 5, 7, 7, 0, 9,	
7, 1, 6, 9, 6, 2, 8, 1, 2, 0, 4, 3, 4, 6, 7, 1,	6, 6, 4, 8, 1, 1, 6, 0, 2,	6, 6, 4, 8, 1, 1, 6, 0, 2,	
0, 7, 0, 7, 9, 4, 0, 1, 2, 3, 5, 6, 3, 5, 6, 7,	6, 0, 7, 5, 5, 0, 5, 2, 6,	6, 0, 7, 5, 5, 0, 5, 2, 6,	
5, 4, 2, 4, 8, 2, 5, 8, 8, 6, 6, 2, 6, 6, 8, 1,	9, 9, 9, 9, 2, 3, 0, 6, 8,	9, 9, 9, 9, 2, 3, 0, 6, 8,	
2, 2, 8, 0, 8, 9, 0, 7, 9, 0, 1, 6, 6, 3, 6, 5,	8, 4, 5, 6, 2, 8, 5, 9, 8,	8, 4, 5, 6, 2, 8, 5, 9, 8,	
1, 5, 9, 0, 3, 7, 3, 7, 2, 0, 0, 2, 7, 5, 2, 9,	3, 6, 8, 8, 6, 2, 1, 2, 1,	3, 6, 8, 8, 6, 2, 1, 2, 1,	
5, 5, 8, 1, 7, 7, 9, 7, 1, 1, 6, 4, 3, 8, 0, 7,	4, 6, 2, 0, 9, 3, 9, 6, 4,	4, 6, 2, 0, 9, 3, 9, 6, 4,	
9, 1, 0, 9, 5, 2, 7, 2, 1, 5, 3, 9, 7, 6, 9, 1,	2, 3, 6, 2, 0, 9, 8, 7, 0,	2, 3, 6, 2, 0, 9, 8, 7, 0,	
3, 5, 5, 0, 6, 9, 4, 7, 1, 7, 2, 0, 4, 5, 8, 1,	6, 0, 7, 0, 5, 9, 4, 3, 7,	6, 0, 7, 0, 5, 9, 4, 3, 7,	
6, 1, 0, 7, 2, 2, 6, 7, 4, 4, 9, 5, 4, 5, 2, 0,	9, 7, 3, 5, 7, 0, 3, 1, 8,	9, 7, 3, 5, 7, 0, 3, 1, 8,	
8, 0, 5, 5, 1, 8, 9, 4, 5, 6, 1, 2, 0, 7, 0, 2,	9, 9, 4, 0, 8, 6, 4, 6, 7,	9, 9, 4, 0, 8, 6, 4, 6, 7,	
1, 6, 8, 8, 7, 8, 7, 0, 1, 8, 5, 6, 5, 9, 2, 2,	3, 8, 1, 2, 1, 5, 4, 9, 5,	3, 8, 1, 2, 1, 5, 4, 9, 5,	
9, 3, 6, 0, 1, 7, 9, 8, 1, 1, 5, 4, 5, 7, 5, 0,	9, 5, 8, 6, 6, 8, 9, 4, 4,	9, 5, 8, 6, 6, 8, 9, 4, 4,	
2, 0, 4, 4, 8, 0, 7, 3}; int k = 196;	0, 6, 4, 5, 3, 0, 3, 9, 7,	0, 6, 4, 5, 3, 0, 3, 9, 7,	
LLNode* head = LLNode::createWithIterators(arr,	1, 7, 2, 5, 0, 1, 9, 1, 2, 5, 6, 8, 7, 1, 6, 9, 6, 2,	1, 7, 2, 5, 0, 1, 9, 1, 2, 5, 6, 8, 7, 1, 6, 9, 6, 2,	
arr + sizeof(arr) / sizeof(int));	8, 1, 2, 0, 4, 3, 4, 6, 7,	8, 1, 2, 0, 4, 3, 4, 6, 7,	
LLNode::printList(head);	1, 0, 7, 0, 7, 9, 4, 0, 1,	1, 0, 7, 0, 7, 9, 4, 0, 1,	
cout << "\n";	2, 3, 5, 6, 3, 5, 6, 7, 5,	2, 3, 5, 6, 3, 5, 6, 7, 5,	
<pre>LLNode* newhead = rotateLinkedList(head, k);</pre>	4, 2, 4, 8, 2, 5, 8, 8, 6,	4, 2, 4, 8, 2, 5, 8, 8, 6,	
<pre>LLNode::printList(newhead);</pre>	6, 2, 6, 6, 8, 1, 2, 2, 8,	6, 2, 6, 6, 8, 1, 2, 2, 8,	
	0, 8, 9, 0, 7, 9, 0, 1, 6,	0, 8, 9, 0, 7, 9, 0, 1, 6,	
	6, 3, 6, 5, 1, 5, 9, 0, 3,	6, 3, 6, 5, 1, 5, 9, 0, 3,	
	7, 3, 7, 2, 0, 0, 2, 7, 5,	7, 3, 7, 2, 0, 0, 2, 7, 5,	
	2, 9, 5, 5, 8, 1, 7, 7, 9,	2, 9, 5, 5, 8, 1, 7, 7, 9,	
	7, 1, 1, 6, 4, 3, 8, 0, 7,	7, 1, 1, 6, 4, 3, 8, 0, 7,	
	9, 1, 0, 9, 5, 2, 7, 2, 1,	9, 1, 0, 9, 5, 2, 7, 2, 1,	
	5, 3, 9, 7, 6, 9, 1, 3, 5,	5, 3, 9, 7, 6, 9, 1, 3, 5,	
	5, 0, 6, 9, 4, 7, 1, 7, 2,	5, 0, 6, 9, 4, 7, 1, 7, 2,	
	0, 4, 5, 8, 1, 6, 1, 0, 7,	0, 4, 5, 8, 1, 6, 1, 0, 7,	
	2, 2, 6, 7, 4, 4, 9, 5, 4, 5, 2, 0, 8, 0, 5, 5, 1, 8,	2, 2, 6, 7, 4, 4, 9, 5, 4, 5, 2, 0, 8, 0, 5, 5, 1, 8,	
	9, 4, 5, 6, 1, 2, 0, 7, 0,	9, 4, 5, 6, 1, 2, 0, 7, 0,	
	2, 1, 6, 8, 8, 7, 8, 7, 0,	2, 1, 6, 8, 8, 7, 8, 7, 0,	
	1, 8, 5, 6, 5, 9, 2, 2, 9,	1, 8, 5, 6, 5, 9, 2, 2, 9,	
	3, 6, 0, 1, 7, 9, 8, 1, 1,	3, 6, 0, 1, 7, 9, 8, 1, 1,	
	5, 4, 5, 7, 5, 0, 2, 0, 4,	5, 4, 5, 7, 5, 0, 2, 0, 4,	
	4, 8, 0, 7, 3]	4, 8, 0, 7, 3]	
	[6, 2, 8, 1, 2, 0, 4, 3, 4,	[6, 2, 8, 1, 2, 0, 4, 3, 4,	
	6, 7, 1, 0, 7, 0, 7, 9, 4,	6, 7, 1, 0, 7, 0, 7, 9, 4,	
	0, 1, 2, 3, 5, 6, 3, 5, 6,	0, 1, 2, 3, 5, 6, 3, 5, 6,	
	7, 5, 4, 2, 4, 8, 2, 5, 8,	7, 5, 4, 2, 4, 8, 2, 5, 8,	
	8, 6, 6, 2, 6, 6, 8, 1, 2,	8, 6, 6, 2, 6, 6, 8, 1, 2,	
	2, 8, 0, 8, 9, 0, 7, 9, 0,	2, 8, 0, 8, 9, 0, 7, 9, 0,	
	1, 6, 6, 3, 6, 5, 1, 5, 9,	1, 6, 6, 3, 6, 5, 1, 5, 9,	
	0, 3, 7, 3, 7, 2, 0, 0, 2,	0, 3, 7, 3, 7, 2, 0, 0, 2,	
	7, 5, 2, 9, 5, 5, 8, 1, 7,	7, 5, 2, 9, 5, 5, 8, 1, 7,	
	7, 9, 7, 1, 1, 6, 4, 3, 8, 0, 7, 9, 1, 0, 9, 5, 2, 7,	7, 9, 7, 1, 1, 6, 4, 3, 8, 0, 7, 9, 1, 0, 9, 5, 2, 7,	
	2, 1, 5, 3, 9, 7, 6, 9, 1	2, 1, 5, 5, 9, /, n , 9,	
	2, 1, 5, 3, 9, 7, 6, 9, 1, 3, 5, 5, 0, 6, 9, 4, 7, 1,	2, 1, 5, 3, 9, 7, 6, 9, 1, 3, 5, 5, 0, 6, 9, 4, 7, 1,	
	2, 1, 5, 3, 9, 7, 6, 9, 1, 3, 5, 5, 0, 6, 9, 4, 7, 1, 7, 2, 0, 4, 5, 8, 1, 6, 1,	2, 1, 5, 5, 9, 7, 6, 9, 1, 3, 5, 5, 0, 6, 9, 4, 7, 1, 7, 2, 0, 4, 5, 8, 1, 6, 1,	

11:1	14 PM	Singly Linked List: Xem lại lần làm thử	BK-LMS
	Test	Expected	Got
		5, 4, 5, 2, 0, 8, 0, 5, 5,	5, 4, 5, 2, 0, 8, 0, 5, 5,
		1, 8, 9, 4, 5, 6, 1, 2, 0,	1, 8, 9, 4, 5, 6, 1, 2, 0,
		7, 0, 2, 1, 6, 8, 8, 7, 8,	7, 0, 2, 1, 6, 8, 8, 7, 8,
		7, 0, 1, 8, 5, 6, 5, 9, 2,	7, 0, 1, 8, 5, 6, 5, 9, 2,
		2, 9, 3, 6, 0, 1, 7, 9, 8,	2, 9, 3, 6, 0, 1, 7, 9, 8,
		1, 1, 5, 4, 5, 7, 5, 0, 2,	1, 1, 5, 4, 5, 7, 5, 0, 2,
		0, 4, 4, 8, 0, 7, 3, 9, 1,	0, 4, 4, 8, 0, 7, 3, 9, 1,
		7, 5, 8, 6, 2, 2, 2, 6, 0,	7, 5, 8, 6, 2, 2, 2, 6, 0,
		8, 1, 9, 6, 8, 4, 8, 4, 3,	8, 1, 9, 6, 8, 4, 8, 4, 3,
		7, 0, 7, 8, 9, 5, 3, 4, 7,	7, 0, 7, 8, 9, 5, 3, 4, 7,
		4, 3, 5, 2, 2, 7, 8, 9, 7,	4, 3, 5, 2, 2, 7, 8, 9, 7,
		1, 9, 9, 8, 3, 5, 7, 1, 6,	1, 9, 9, 8, 3, 5, 7, 1, 6,
		9, 1, 2, 0, 6, 8, 0, 4, 1,	9, 1, 2, 0, 6, 8, 0, 4, 1,
		6, 5, 8, 7, 6, 8, 0, 5, 7,	6, 5, 8, 7, 6, 8, 0, 5, 7,
		8, 8, 6, 7, 5, 8, 0, 7, 6,	8, 8, 6, 7, 5, 8, 0, 7, 6,
		4, 9, 5, 9, 6, 4, 1, 5, 6,	4, 9, 5, 9, 6, 4, 1, 5, 6,
		2, 2, 6, 7, 0, 3, 4, 2, 3,	2, 2, 6, 7, 0, 3, 4, 2, 3,
		9, 0, 9, 6, 3, 6, 7, 5, 5,	9, 0, 9, 6, 3, 6, 7, 5, 5,
		5, 9, 0, 6, 1, 1, 5, 0, 9,	5, 9, 0, 6, 1, 1, 5, 0, 9,
		1, 1, 1, 0, 4, 6, 3, 3, 3,	1, 1, 1, 0, 4, 6, 3, 3, 3,
		5, 8, 7, 4, 7, 1, 7, 1, 8,	5, 8, 7, 4, 7, 1, 7, 1, 8,
		4, 2, 0, 1, 9, 0, 7, 9, 2,	4, 2, 0, 1, 9, 0, 7, 9, 2,
		8, 9, 2, 5, 3, 5, 9, 3, 2,	8, 9, 2, 5, 3, 5, 9, 3, 2,
		7, 3, 5, 9, 5, 5, 3, 2, 3,	7, 3, 5, 9, 5, 5, 3, 2, 3,
		9, 4, 1, 6, 1, 8, 3, 1, 4,	9, 4, 1, 6, 1, 8, 3, 1, 4,
		5, 2, 5, 7, 7, 0, 9, 6, 6,	5, 2, 5, 7, 7, 0, 9, 6, 6,
		4, 8, 1, 1, 6, 0, 2, 6, 0,	4, 8, 1, 1, 6, 0, 2, 6, 0,
		7, 5, 5, 0, 5, 2, 6, 9, 9, 9, 9, 2, 3, 0, 6, 8, 8, 4,	7, 5, 5, 0, 5, 2, 6, 9, 9,
			9, 9, 2, 3, 0, 6, 8, 8, 4,
		5, 6, 2, 8, 5, 9, 8, 3, 6,	5, 6, 2, 8, 5, 9, 8, 3, 6,
		8, 8, 6, 2, 1, 2, 1, 4, 6, 2, 0, 9, 3, 9, 6, 4, 2, 3,	8, 8, 6, 2, 1, 2, 1, 4, 6, 2, 0, 9, 3, 9, 6, 4, 2, 3,
		6, 2, 0, 9, 8, 7, 0, 6, 0,	6, 2, 0, 9, 8, 7, 0, 6, 0,
		7, 0, 5, 9, 4, 3, 7, 9, 7,	7, 0, 5, 9, 4, 3, 7, 9, 7,
		3, 5, 7, 0, 3, 1, 8, 9, 9,	3, 5, 7, 0, 3, 1, 8, 9, 9,
		4, 0, 8, 6, 4, 6, 7, 3, 8,	4, 0, 8, 6, 4, 6, 7, 3, 8,
		1, 2, 1, 5, 4, 9, 5, 9, 5,	1, 2, 1, 5, 4, 9, 5, 9, 5,
		8, 6, 6, 8, 9, 4, 4, 0, 6,	8, 6, 6, 8, 9, 4, 4, 0, 6,
		4, 5, 3, 0, 3, 9, 7, 1, 7,	4, 5, 3, 0, 3, 9, 7, 1, 7,
		2, 5, 0, 1, 9, 1, 2, 5, 6,	2, 5, 0, 1, 9, 1, 2, 5, 6,
		8, 7, 1, 6, 9]	8, 7, 1, 6, 9]
		0, 7, 1, 0, 2]	0, 7, 2, 0, 2]

	Test	Expected	Got
/	int arr[] = {8, 0, 8, 8, 9, 3, 3, 5, 4, 9, 7, 9,	[8, 0, 8, 8, 9, 3, 3, 5, 4,	[8, 0, 8, 8, 9, 3, 3, 5, 4,
	5, 3, 8, 6, 1, 0, 6, 4, 5, 1, 1, 5, 3, 8, 6, 1,	9, 7, 9, 5, 3, 8, 6, 1, 0,	9, 7, 9, 5, 3, 8, 6, 1, 0,
	1, 1, 0, 1, 4, 9, 0, 1, 8, 0, 2, 7, 1, 5, 7, 6,	6, 4, 5, 1, 1, 5, 3, 8, 6,	6, 4, 5, 1, 1, 5, 3, 8, 6,
	7, 7, 9, 5, 0, 9, 6, 3, 7, 6, 6, 4, 6, 2, 9, 1,	1, 1, 1, 0, 1, 4, 9, 0, 1,	1, 1, 1, 0, 1, 4, 9, 0, 1,
	5, 0, 8, 6, 0, 8, 6, 3, 0, 3, 6, 8, 5, 0, 1, 9,	8, 0, 2, 7, 1, 5, 7, 6, 7,	8, 0, 2, 7, 1, 5, 7, 6, 7,
	9, 6, 3, 3, 2, 9, 2, 0, 0, 5, 0, 4, 6, 7, 2, 6,	7, 9, 5, 0, 9, 6, 3, 7, 6,	7, 9, 5, 0, 9, 6, 3, 7, 6,
	5, 2, 8, 8, 7, 1, 0, 9, 7, 7, 1, 5, 8, 7, 5, 7,	6, 4, 6, 2, 9, 1, 5, 0, 8,	6, 4, 6, 2, 9, 1, 5, 0, 8,
	8, 7, 8, 7, 1, 7, 9, 7, 1, 3, 0, 5, 5, 1, 0, 2,	6, 0, 8, 6, 3, 0, 3, 6, 8,	6, 0, 8, 6, 3, 0, 3, 6, 8,
	1, 0, 1, 5, 3, 7, 7, 9, 6, 1, 6, 4, 8, 9, 8, 6,	5, 0, 1, 9, 9, 6, 3, 3, 2,	5, 0, 1, 9, 9, 6, 3, 3, 2,
	0, 0, 3, 6, 2, 3, 4, 9, 7, 4, 2, 2, 9, 7, 7, 4,	9, 2, 0, 0, 5, 0, 4, 6, 7,	9, 2, 0, 0, 5, 0, 4, 6, 7,
	9, 9, 7, 5, 6, 2, 4, 0, 1, 9, 9, 8, 4, 6, 1, 2,	2, 6, 5, 2, 8, 8, 7, 1, 0,	2, 6, 5, 2, 8, 8, 7, 1, 0,
	9, 6, 7, 9, 4, 7, 5, 2, 9, 4, 2, 5, 9, 4, 1, 6,	9, 7, 7, 1, 5, 8, 7, 5, 7,	9, 7, 7, 1, 5, 8, 7, 5, 7,
	0, 0, 5, 0, 0, 6, 1, 7, 8, 6, 9, 5, 4, 7, 0, 5, 3, 2, 4, 9, 9, 2, 3, 4, 4, 1, 8, 2, 4, 4, 6, 2,	8, 7, 8, 7, 1, 7, 9, 7, 1, 3, 0, 5, 5, 1, 0, 2, 1, 0,	8, 7, 8, 7, 1, 7, 9, 7, 1, 3, 0, 5, 5, 1, 0, 2, 1, 0,
	0, 5, 9, 4, 5, 8, 1, 8, 4, 7, 5, 4, 9, 7, 3, 1,	1, 5, 3, 7, 7, 9, 6, 1, 6,	1, 5, 3, 7, 7, 9, 6, 1, 6,
	7, 7, 5, 4, 5, 6, 2, 1, 7, 5, 9, 7, 4, 8, 4, 6,	4, 8, 9, 8, 6, 0, 0, 3, 6,	4, 8, 9, 8, 6, 0, 0, 3, 6,
	9, 3, 4, 4, 3, 7, 1, 3, 9, 3, 3, 7, 9, 7, 9, 4,	2, 3, 4, 9, 7, 4, 2, 2, 9,	2, 3, 4, 9, 7, 4, 2, 2, 9,
	6, 0, 5, 5, 5, 6, 2, 5, 5, 9, 0, 2, 9, 0, 3, 8,	7, 7, 4, 9, 9, 7, 5, 6, 2,	7, 7, 4, 9, 9, 7, 5, 6, 2,
	7, 6, 1, 0, 4, 0, 7, 4, 2, 5, 0, 0, 6, 4, 3, 6,	4, 0, 1, 9, 9, 8, 4, 6, 1,	4, 0, 1, 9, 9, 8, 4, 6, 1,
	0, 9, 2, 4, 1, 0, 3, 8, 0, 1, 7, 3, 8, 9, 0, 5,	2, 9, 6, 7, 9, 4, 7, 5, 2,	2, 9, 6, 7, 9, 4, 7, 5, 2,
	3, 2, 8, 4, 0, 4, 6, 9, 8, 6, 5, 2, 7, 9, 0, 1,	9, 4, 2, 5, 9, 4, 1, 6, 0,	9, 4, 2, 5, 9, 4, 1, 6, 0,
	7, 5, 5, 9, 5, 6, 8, 2, 8, 6, 7, 4, 5, 9, 0, 2,	0, 5, 0, 0, 6, 1, 7, 8, 6,	0, 5, 0, 0, 6, 1, 7, 8, 6,
	6, 8, 4, 3, 5, 9, 9, 1, 0, 3, 2, 3, 8, 1, 0, 5,	9, 5, 4, 7, 0, 5, 3, 2, 4,	9, 5, 4, 7, 0, 5, 3, 2, 4,
	9, 6, 8, 9, 0, 9, 9, 4, 7, 5, 1, 7, 0, 3, 8, 9,	9, 9, 2, 3, 4, 4, 1, 8, 2,	9, 9, 2, 3, 4, 4, 1, 8, 2,
	9, 1, 0, 3, 0, 4, 2, 6, 6, 9, 1, 2, 5, 2, 3, 5,	4, 4, 6, 2, 0, 5, 9, 4, 5,	4, 4, 6, 2, 0, 5, 9, 4, 5,
	1, 5, 0, 1, 6, 4, 8, 8, 4, 9, 5, 6, 5, 4, 2, 5,	8, 1, 8, 4, 7, 5, 4, 9, 7,	8, 1, 8, 4, 7, 5, 4, 9, 7,
	9, 7, 3, 0, 6, 6, 8, 8, 7, 1, 0, 5, 3, 5, 5, 9,	3, 1, 7, 7, 5, 4, 5, 6, 2,	3, 1, 7, 7, 5, 4, 5, 6, 2,
	4, 8, 4, 6, 9, 3, 8, 3, 4, 9, 6, 8, 9, 7, 3, 4, 1, 0, 1, 2, 0, 0, 8, 1, 8, 5, 1, 5, 1, 0, 1, 1,	1, 7, 5, 9, 7, 4, 8, 4, 6, 9, 3, 4, 4, 3, 7, 1, 3, 9,	1, 7, 5, 9, 7, 4, 8, 4, 6, 9, 3, 4, 4, 3, 7, 1, 3, 9,
	4, 0, 8, 7, 2, 8, 0, 0, 9, 6, 2, 1, 5, 1, 3, 4,	3, 3, 7, 9, 7, 9, 4, 6, 0,	3, 3, 7, 9, 7, 9, 4, 6, 0,
	2, 5, 2, 0, 2, 5, 8, 1, 1, 6, 4, 6, 5, 8, 5, 9,	5, 5, 5, 6, 2, 5, 5, 9, 0,	5, 5, 5, 6, 2, 5, 5, 9, 0,
	5, 8, 1, 8, 5, 4, 2, 0, 5, 5, 0, 1, 9, 7, 1, 1,	2, 9, 0, 3, 8, 7, 6, 1, 0,	2, 9, 0, 3, 8, 7, 6, 1, 0,
	7, 6, 1, 8, 8, 4, 6, 4, 4, 3, 1, 0, 3, 3, 7, 9,	4, 0, 7, 4, 2, 5, 0, 0, 6,	4, 0, 7, 4, 2, 5, 0, 0, 6,
	7, 9, 5, 1, 5, 1, 5, 2, 0, 3, 1, 4, 9, 2, 6, 5,	4, 3, 6, 0, 9, 2, 4, 1, 0,	4, 3, 6, 0, 9, 2, 4, 1, 0,
	3, 2, 7, 8, 1, 6, 7, 0, 2, 7, 6, 1, 5, 8, 3, 5,	3, 8, 0, 1, 7, 3, 8, 9, 0,	3, 8, 0, 1, 7, 3, 8, 9, 0,
	0, 4, 7, 9, 8, 8, 2, 6, 9, 9, 7, 8, 3, 8, 8, 0,	5, 3, 2, 8, 4, 0, 4, 6, 9,	5, 3, 2, 8, 4, 0, 4, 6, 9,
	8, 6, 4, 5, 7, 2, 0, 7, 3, 5, 5, 3, 5, 6, 2, 3,	8, 6, 5, 2, 7, 9, 0, 1, 7,	8, 6, 5, 2, 7, 9, 0, 1, 7,
	3, 1, 2, 4, 4, 4, 5, 5, 4, 9, 7, 0, 8, 0, 4, 3,	5, 5, 9, 5, 6, 8, 2, 8, 6,	5, 5, 9, 5, 6, 8, 2, 8, 6,
	0, 9, 7, 7, 8, 1, 3, 7, 1, 5, 4, 7, 6, 3, 8, 6,	7, 4, 5, 9, 0, 2, 6, 8, 4,	7, 4, 5, 9, 0, 2, 6, 8, 4,
	7, 5, 4, 2, 0, 6, 7, 4, 7, 4, 6, 1, 3, 7, 2, 4,	3, 5, 9, 9, 1, 0, 3, 2, 3,	3, 5, 9, 9, 1, 0, 3, 2, 3,
	4, 0, 1, 2, 9, 1, 9, 5, 7, 1, 7, 7, 3, 2, 9, 8, 2, 4, 4, 9, 0, 5, 6, 7, 9, 1, 8, 3, 8, 2, 3, 2,	8, 1, 0, 5, 9, 6, 8, 9, 0, 9, 9, 4, 7, 5, 1, 7, 0, 3,	8, 1, 0, 5, 9, 6, 8, 9, 0, 9, 9, 4, 7, 5, 1, 7, 0, 3,
	4, 6, 2, 0, 7, 5, 9, 5, 2, 2, 6, 8, 6, 9, 9, 3,	8, 9, 9, 1, 0, 3, 0, 4, 2,	8, 9, 9, 1, 0, 3, 0, 4, 2,
	0, 4, 1, 5, 2, 3, 9, 3, 9, 1, 7, 3, 1, 2, 8, 2,	6, 6, 9, 1, 2, 5, 2, 3, 5,	6, 6, 9, 1, 2, 5, 2, 3, 5,
	0, 4, 1, 1, 8, 4, 8, 2, 0, 0, 6, 6, 5, 1, 3, 5,	1, 5, 0, 1, 6, 4, 8, 8, 4,	1, 5, 0, 1, 6, 4, 8, 8, 4,
	0, 6, 1, 6, 1, 7, 9, 2, 3, 5, 2, 9, 6, 8, 3, 6,	9, 5, 6, 5, 4, 2, 5, 9, 7,	9, 5, 6, 5, 4, 2, 5, 9, 7,
	9, 4, 1, 0, 8, 7, 2, 5, 7, 4, 4, 0, 2, 0, 6, 6,	3, 0, 6, 6, 8, 8, 7, 1, 0,	3, 0, 6, 6, 8, 8, 7, 1, 0,
	4, 9, 1, 8, 1, 1, 8, 8, 3, 5, 2, 5, 5, 5, 1, 8,	5, 3, 5, 5, 9, 4, 8, 4, 6,	5, 3, 5, 5, 9, 4, 8, 4, 6,
	3, 7, 8, 8, 1, 1, 5, 5, 1, 9, 7, 2, 2, 7, 2, 4,	9, 3, 8, 3, 4, 9, 6, 8, 9,	9, 3, 8, 3, 4, 9, 6, 8, 9,
	4, 1, 0, 0, 0, 8, 7, 9, 4, 0, 0, 3, 5, 5, 1, 9,	7, 3, 4, 1, 0, 1, 2, 0, 0,	7, 3, 4, 1, 0, 1, 2, 0, 0,
	5, 9, 3, 7, 5, 9, 0, 9, 8, 2, 7, 2, 0, 5, 2, 5,	8, 1, 8, 5, 1, 5, 1, 0, 1,	8, 1, 8, 5, 1, 5, 1, 0, 1,
	1, 6, 0, 8, 5, 2, 4, 9, 0, 8, 3, 9, 1, 9, 9, 2,	1, 4, 0, 8, 7, 2, 8, 0, 0,	1, 4, 0, 8, 7, 2, 8, 0, 0,
	5, 5, 3, 0, 5, 4, 4, 5, 3, 2, 0, 2, 4, 3, 5, 1,	9, 6, 2, 1, 5, 1, 3, 4, 2,	9, 6, 2, 1, 5, 1, 3, 4, 2,
	9, 3, 0, 8, 1, 4, 4, 9, 9, 0, 9, 9, 1, 3, 0, 1,	5, 2, 0, 2, 5, 8, 1, 1, 6,	5, 2, 0, 2, 5, 8, 1, 1, 6,
	1, 9, 6, 9, 2, 4, 4, 2, 5, 2, 3, 9, 6, 2, 3, 0, 8, 3, 2, 8, 8, 3, 0, 5, 1, 8, 8, 2, 9, 3, 7, 7,	4, 6, 5, 8, 5, 9, 5, 8, 1, 8, 5, 4, 2, 0, 5, 5, 0, 1,	4, 6, 5, 8, 5, 9, 5, 8, 1, 8, 5, 4, 2, 0, 5, 5, 0, 1,
	4, 9, 6, 2, 0, 0, 6, 8, 4, 6, 7, 7, 8, 0, 7, 7,	9, 7, 1, 1, 7, 6, 1, 8, 8,	9, 7, 1, 1, 7, 6, 1, 8, 8,
	5, 6, 5, 6, 2, 8, 3, 2, 7, 5, 7, 4, 0, 0, 2, 2,	4, 6, 4, 4, 3, 1, 0, 3, 3,	4, 6, 4, 4, 3, 1, 0, 3, 3,
	6, 7, 8, 5, 9, 3, 3, 0, 6, 5, 4, 5, 9, 4, 1, 2,	7, 9, 7, 9, 5, 1, 5, 1, 5,	7, 9, 7, 9, 5, 1, 5, 1, 5,
	9, 7, 6, 2, 0, 2, 3, 3, 8, 0, 1, 8, 4, 7, 1, 0,	2, 0, 3, 1, 4, 9, 2, 6, 5,	2, 0, 3, 1, 4, 9, 2, 6, 5,
	6, 4, 1, 0, 4, 0, 4, 8, 9, 5, 1, 0, 5, 2, 4, 5,	3, 2, 7, 8, 1, 6, 7, 0, 2,	3, 2, 7, 8, 1, 6, 7, 0, 2,
	6, 3, 5, 2, 2, 9, 6, 0, 2, 1, 2, 9, 7, 8, 3, 1,	7, 6, 1, 5, 8, 3, 5, 0, 4,	7, 6, 1, 5, 8, 3, 5, 0, 4,
	6, 0, 2, 2, 7, 8, 9, 3, 4, 5, 7, 8, 4, 0, 7, 2,	7, 9, 8, 8, 2, 6, 9, 9, 7,	7, 9, 8, 8, 2, 6, 9, 9, 7,
	8};	8, 3, 8, 8, 0, 8, 6, 4, 5,	8, 3, 8, 8, 0, 8, 6, 4, 5,
	int k = 389;	7, 2, 0, 7, 3, 5, 5, 3, 5,	7, 2, 0, 7, 3, 5, 5, 3, 5,
	LLNode* head = LLNode::createWithIterators(arr,	6, 2, 3, 3, 1, 2, 4, 4, 4,	6, 2, 3, 3, 1, 2, 4, 4, 4,
	<pre>arr + sizeof(arr) / sizeof(int));</pre>	5, 5, 4, 9, 7, 0, 8, 0, 4,	5, 5, 4, 9, 7, 0, 8, 0, 4,
	LLNode::printList(head);	3, 0, 9, 7, 7, 8, 1, 3, 7,	3, 0, 9, 7, 7, 8, 1, 3, 7,
	cout << "\n";	1, 5, 4, 7, 6, 3, 8, 6, 7,	1, 5, 4, 7, 6, 3, 8, 6, 7,
	<pre>LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	5, 4, 2, 0, 6, 7, 4, 7, 4,	5, 4, 2, 0, 6, 7, 4, 7, 4,
	LLNOUE::Drintlist(NeWnead):	6, 1, 3, 7, 2, 4, 4, 0, 1,	6, 1, 3, 7, 2, 4, 4, 0, 1,

11:14 F	M Singly	Linked List: Xem lại lân làm thứ	BK-LMS
	Test	Expected	Got
		2, 9, 1, 9, 5, 7, 1, 7, 7,	2, 9, 1, 9, 5, 7, 1, 7, 7,
		3, 2, 9, 8, 2, 4, 4, 9, 0,	3, 2, 9, 8, 2, 4, 4, 9, 0,
		5, 6, 7, 9, 1, 8, 3, 8, 2,	5, 6, 7, 9, 1, 8, 3, 8, 2,
		3, 2, 4, 6, 2, 0, 7, 5, 9,	3, 2, 4, 6, 2, 0, 7, 5, 9,
		5, 2, 2, 6, 8, 6, 9, 9, 3,	5, 2, 2, 6, 8, 6, 9, 9, 3,
		0, 4, 1, 5, 2, 3, 9, 3, 9, 1, 7, 3, 1, 2, 8, 2, 0, 4,	0, 4, 1, 5, 2, 3, 9, 3, 9, 1, 7, 3, 1, 2, 8, 2, 0, 4,
		1, 1, 8, 4, 8, 2, 0, 0, 6,	1, 1, 8, 4, 8, 2, 0, 0, 6,
		6, 5, 1, 3, 5, 0, 6, 1, 6,	6, 5, 1, 3, 5, 0, 6, 1, 6,
		1, 7, 9, 2, 3, 5, 2, 9, 6,	1, 7, 9, 2, 3, 5, 2, 9, 6,
		8, 3, 6, 9, 4, 1, 0, 8, 7,	8, 3, 6, 9, 4, 1, 0, 8, 7,
		2, 5, 7, 4, 4, 0, 2, 0, 6,	2, 5, 7, 4, 4, 0, 2, 0, 6,
		6, 4, 9, 1, 8, 1, 1, 8, 8,	6, 4, 9, 1, 8, 1, 1, 8, 8,
		3, 5, 2, 5, 5, 5, 1, 8, 3,	3, 5, 2, 5, 5, 5, 1, 8, 3,
		7, 8, 8, 1, 1, 5, 5, 1, 9,	7, 8, 8, 1, 1, 5, 5, 1, 9,
		7, 2, 2, 7, 2, 4, 4, 1, 0, 0, 0, 8, 7, 9, 4, 0, 0, 3,	7, 2, 2, 7, 2, 4, 4, 1, 0,
		5, 5, 1, 9, 5, 9, 3, 7, 5,	0, 0, 8, 7, 9, 4, 0, 0, 3, 5, 5, 1, 9, 5, 9, 3, 7, 5,
		9, 0, 9, 8, 2, 7, 2, 0, 5,	9, 0, 9, 8, 2, 7, 2, 0, 5,
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		2, 0, 2, 4, 3, 5, 1, 9, 3,	2, 0, 2, 4, 3, 5, 1, 9, 3,
		0, 8, 1, 4, 4, 9, 9, 0, 9,	0, 8, 1, 4, 4, 9, 9, 0, 9,
		9, 1, 3, 0, 1, 1, 9, 6, 9,	9, 1, 3, 0, 1, 1, 9, 6, 9,
		2, 4, 4, 2, 5, 2, 3, 9, 6,	2, 4, 4, 2, 5, 2, 3, 9, 6,
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		0, 5, 1, 8, 8, 2, 9, 3, 7,	0, 5, 1, 8, 8, 2, 9, 3, 7,
		7, 4, 9, 6, 2, 0, 0, 6, 8,	7, 4, 9, 6, 2, 0, 0, 6, 8,
		4, 6, 7, 7, 8, 0, 7, 7, 5,	4, 6, 7, 7, 8, 0, 7, 7, 5,
		6, 5, 6, 2, 8, 3, 2, 7, 5, 7, 4, 0, 0, 2, 2, 6, 7, 8,	6, 5, 6, 2, 8, 3, 2, 7, 5, 7, 4, 0, 0, 2, 2, 6, 7, 8,
		5, 9, 3, 3, 0, 6, 5, 4, 5,	5, 9, 3, 3, 0, 6, 5, 4, 5,
		9, 4, 1, 2, 9, 7, 6, 2, 0,	9, 4, 1, 2, 9, 7, 6, 2, 0,
		2, 3, 3, 8, 0, 1, 8, 4, 7,	2, 3, 3, 8, 0, 1, 8, 4, 7,
		1, 0, 6, 4, 1, 0, 4, 0, 4,	1, 0, 6, 4, 1, 0, 4, 0, 4,
		8, 9, 5, 1, 0, 5, 2, 4, 5,	8, 9, 5, 1, 0, 5, 2, 4, 5,
		6, 3, 5, 2, 2, 9, 6, 0, 2,	6, 3, 5, 2, 2, 9, 6, 0, 2,
		1, 2, 9, 7, 8, 3, 1, 6, 0,	1, 2, 9, 7, 8, 3, 1, 6, 0,
		2, 2, 7, 8, 9, 3, 4, 5, 7,	2, 2, 7, 8, 9, 3, 4, 5, 7,
		8, 4, 0, 7, 2, 8]	8, 4, 0, 7, 2, 8]
		[6, 3, 8, 6, 7, 5, 4, 2, 0, 6, 7, 4, 7, 4, 6, 1, 3, 7,	[6, 3, 8, 6, 7, 5, 4, 2, 0, 6, 7, 4, 7, 4, 6, 1, 3, 7,
		2, 4, 4, 0, 1, 2, 9, 1, 9,	2, 4, 4, 0, 1, 2, 9, 1, 9,
		5, 7, 1, 7, 7, 3, 2, 9, 8,	5, 7, 1, 7, 7, 3, 2, 9, 8,
		2, 4, 4, 9, 0, 5, 6, 7, 9,	2, 4, 4, 9, 0, 5, 6, 7, 9,
		1, 8, 3, 8, 2, 3, 2, 4, 6,	1, 8, 3, 8, 2, 3, 2, 4, 6,
		2, 0, 7, 5, 9, 5, 2, 2, 6,	2, 0, 7, 5, 9, 5, 2, 2, 6,
		8, 6, 9, 9, 3, 0, 4, 1, 5,	8, 6, 9, 9, 3, 0, 4, 1, 5,
		2, 3, 9, 3, 9, 1, 7, 3, 1,	2, 3, 9, 3, 9, 1, 7, 3, 1,
		2, 8, 2, 0, 4, 1, 1, 8, 4,	2, 8, 2, 0, 4, 1, 1, 8, 4,
		8, 2, 0, 0, 6, 6, 5, 1, 3,	8, 2, 0, 0, 6, 6, 5, 1, 3,
		5, 0, 6, 1, 6, 1, 7, 9, 2, 3, 5, 2, 9, 6, 8, 3, 6, 9,	5, 0, 6, 1, 6, 1, 7, 9, 2, 3, 5, 2, 9, 6, 8, 3, 6, 9,
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		4, 0, 2, 0, 6, 6, 4, 9, 1,	4, 0, 2, 0, 6, 6, 4, 9, 1,
		8, 1, 1, 8, 8, 3, 5, 2, 5,	8, 1, 1, 8, 8, 3, 5, 2, 5,
		5, 5, 1, 8, 3, 7, 8, 8, 1,	5, 5, 1, 8, 3, 7, 8, 8, 1,
		1, 5, 5, 1, 9, 7, 2, 2, 7,	1, 5, 5, 1, 9, 7, 2, 2, 7,
		2, 4, 4, 1, 0, 0, 0, 8, 7,	2, 4, 4, 1, 0, 0, 0, 8, 7,
		9, 4, 0, 0, 3, 5, 5, 1, 9,	9, 4, 0, 0, 3, 5, 5, 1, 9,
		5, 9, 3, 7, 5, 9, 0, 9, 8,	5, 9, 3, 7, 5, 9, 0, 9, 8,
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		0, 8, 5, 2, 4, 9, 0, 8, 3, 9, 1, 9, 9, 2, 5, 5, 3, 0,	0, 8, 5, 2, 4, 9, 0, 8, 3,
		5, 4, 4, 5, 3, 2, 0, 2, 4,	9, 1, 9, 9, 2, 5, 5, 3, 0, 5, 4, 4, 5, 3, 2, 0, 2, 4,
		3, 5, 1, 9, 3, 0, 8, 1, 4,	3, 5, 1, 9, 3, 0, 8, 1, 4,
		4, 9, 9, 0, 9, 9, 1, 3, 0,	4, 9, 9, 0, 9, 9, 1, 3, 0,
		1, 1, 9, 6, 9, 2, 4, 4, 2,	1, 1, 9, 6, 9, 2, 4, 4, 2,
		5, 2, 3, 9, 6, 2, 3, 0, 8,	5, 2, 3, 9, 6, 2, 3, 0, 8,
		3, 2, 8, 8, 3, 0, 5, 1, 8,	3, 2, 8, 8, 3, 0, 5, 1, 8,
1			I

, 11:14	Singly Singly	Linked List: Xem lại lân làm thứ	BK-LIMS
	Test	Expected	Got
		8, 2, 9, 3, 7, 7, 4, 9, 6,	8, 2, 9, 3, 7, 7, 4, 9, 6,
		2, 0, 0, 6, 8, 4, 6, 7, 7,	2, 0, 0, 6, 8, 4, 6, 7, 7,
		8, 0, 7, 7, 5, 6, 5, 6, 2,	8, 0, 7, 7, 5, 6, 5, 6, 2,
		8, 3, 2, 7, 5, 7, 4, 0, 0,	8, 3, 2, 7, 5, 7, 4, 0, 0,
		2, 2, 6, 7, 8, 5, 9, 3, 3,	2, 2, 6, 7, 8, 5, 9, 3, 3,
		0, 6, 5, 4, 5, 9, 4, 1, 2,	0, 6, 5, 4, 5, 9, 4, 1, 2,
		9, 7, 6, 2, 0, 2, 3, 3, 8, 0, 1, 8, 4, 7, 1, 0, 6, 4,	9, 7, 6, 2, 0, 2, 3, 3, 8, 0, 1, 8, 4, 7, 1, 0, 6, 4,
		1, 0, 4, 0, 4, 8, 9, 5, 1,	1, 0, 4, 0, 4, 8, 9, 5, 1,
		0, 5, 2, 4, 5, 6, 3, 5, 2,	0, 5, 2, 4, 5, 6, 3, 5, 2,
		2, 9, 6, 0, 2, 1, 2, 9, 7,	2, 9, 6, 0, 2, 1, 2, 9, 7,
		8, 3, 1, 6, 0, 2, 2, 7, 8,	8, 3, 1, 6, 0, 2, 2, 7, 8,
		9, 3, 4, 5, 7, 8, 4, 0, 7,	9, 3, 4, 5, 7, 8, 4, 0, 7,
		2, 8, 8, 0, 8, 8, 9, 3, 3,	2, 8, 8, 0, 8, 8, 9, 3, 3,
		5, 4, 9, 7, 9, 5, 3, 8, 6,	5, 4, 9, 7, 9, 5, 3, 8, 6,
		1, 0, 6, 4, 5, 1, 1, 5, 3, 8, 6, 1, 1, 1, 0, 1, 4, 9,	1, 0, 6, 4, 5, 1, 1, 5, 3, 8, 6, 1, 1, 1, 0, 1, 4, 9,
		0, 1, 8, 0, 2, 7, 1, 5, 7,	0, 1, 8, 0, 2, 7, 1, 5, 7,
		6, 7, 7, 9, 5, 0, 9, 6, 3,	6, 7, 7, 9, 5, 0, 9, 6, 3,
		7, 6, 6, 4, 6, 2, 9, 1, 5,	7, 6, 6, 4, 6, 2, 9, 1, 5,
		0, 8, 6, 0, 8, 6, 3, 0, 3,	0, 8, 6, 0, 8, 6, 3, 0, 3,
		6, 8, 5, 0, 1, 9, 9, 6, 3,	6, 8, 5, 0, 1, 9, 9, 6, 3,
		3, 2, 9, 2, 0, 0, 5, 0, 4,	3, 2, 9, 2, 0, 0, 5, 0, 4,
		6, 7, 2, 6, 5, 2, 8, 8, 7,	6, 7, 2, 6, 5, 2, 8, 8, 7,
		1, 0, 9, 7, 7, 1, 5, 8, 7, 5, 7, 8, 7, 8, 7, 1, 7, 9,	1, 0, 9, 7, 7, 1, 5, 8, 7, 5, 7, 8, 7, 8, 7, 1, 7, 9,
		7, 1, 3, 0, 5, 5, 1, 0, 2,	7, 1, 3, 0, 5, 5, 1, 0, 2,
		1, 0, 1, 5, 3, 7, 7, 9, 6,	1, 0, 1, 5, 3, 7, 7, 9, 6,
		1, 6, 4, 8, 9, 8, 6, 0, 0,	1, 6, 4, 8, 9, 8, 6, 0, 0,
		3, 6, 2, 3, 4, 9, 7, 4, 2,	3, 6, 2, 3, 4, 9, 7, 4, 2,
		2, 9, 7, 7, 4, 9, 9, 7, 5,	2, 9, 7, 7, 4, 9, 9, 7, 5,
		6, 2, 4, 0, 1, 9, 9, 8, 4,	6, 2, 4, 0, 1, 9, 9, 8, 4,
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		8, 6, 9, 5, 4, 7, 0, 5, 3,	8, 6, 9, 5, 4, 7, 0, 5, 3,
		2, 4, 9, 9, 2, 3, 4, 4, 1,	2, 4, 9, 9, 2, 3, 4, 4, 1,
		8, 2, 4, 4, 6, 2, 0, 5, 9,	8, 2, 4, 4, 6, 2, 0, 5, 9,
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		3, 9, 3, 3, 7, 9, 7, 9, 4,	3, 9, 3, 3, 7, 9, 7, 9, 4,
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		0, 6, 4, 3, 6, 0, 9, 2, 4,	0, 6, 4, 3, 6, 0, 9, 2, 4,
		1, 0, 3, 8, 0, 1, 7, 3, 8, 9, 0, 5, 3, 2, 8, 4, 0, 4,	1, 0, 3, 8, 0, 1, 7, 3, 8,
		6, 9, 8, 6, 5, 2, 7, 9, 0,	9, 0, 5, 3, 2, 8, 4, 0, 4, 6, 9, 8, 6, 5, 2, 7, 9, 0,
		1, 7, 5, 5, 9, 5, 6, 8, 2,	1, 7, 5, 5, 9, 5, 6, 8, 2,
		8, 6, 7, 4, 5, 9, 0, 2, 6,	8, 6, 7, 4, 5, 9, 0, 2, 6,
		8, 4, 3, 5, 9, 9, 1, 0, 3,	8, 4, 3, 5, 9, 9, 1, 0, 3,
		2, 3, 8, 1, 0, 5, 9, 6, 8,	2, 3, 8, 1, 0, 5, 9, 6, 8,
		9, 0, 9, 9, 4, 7, 5, 1, 7,	9, 0, 9, 9, 4, 7, 5, 1, 7,
		0, 3, 8, 9, 9, 1, 0, 3, 0, 4, 2, 6, 6, 9, 1, 2, 5, 2,	0, 3, 8, 9, 9, 1, 0, 3, 0, 4, 2, 6, 6, 9, 1, 2, 5, 2,
		3, 5, 1, 5, 0, 1, 6, 4, 8,	3, 5, 1, 5, 0, 1, 6, 4, 8,
		8, 4, 9, 5, 6, 5, 4, 2, 5,	8, 4, 9, 5, 6, 5, 4, 2, 5,
		9, 7, 3, 0, 6, 6, 8, 8, 7,	9, 7, 3, 0, 6, 6, 8, 8, 7,
		1, 0, 5, 3, 5, 5, 9, 4, 8,	1, 0, 5, 3, 5, 5, 9, 4, 8,
		4, 6, 9, 3, 8, 3, 4, 9, 6,	4, 6, 9, 3, 8, 3, 4, 9, 6,
		8, 9, 7, 3, 4, 1, 0, 1, 2,	8, 9, 7, 3, 4, 1, 0, 1, 2,
		0, 0, 8, 1, 8, 5, 1, 5, 1,	0, 0, 8, 1, 8, 5, 1, 5, 1,
		0, 1, 1, 4, 0, 8, 7, 2, 8, 0, 0, 9, 6, 2, 1, 5, 1, 3,	0, 1, 1, 4, 0, 8, 7, 2, 8, 0, 0, 9, 6, 2, 1, 5, 1, 3,
		4, 2, 5, 2, 0, 2, 5, 8, 1,	4, 2, 5, 2, 0, 2, 5, 8, 1,
		1, 6, 4, 6, 5, 8, 5, 9, 5,	1, 6, 4, 6, 5, 8, 5, 9, 5,
		8, 1, 8, 5, 4, 2, 0, 5, 5,	8, 1, 8, 5, 4, 2, 0, 5, 5,
		0, 1, 9, 7, 1, 1, 7, 6, 1,	0, 1, 9, 7, 1, 1, 7, 6, 1,
		8, 8, 4, 6, 4, 4, 3, 1, 0,	8, 8, 4, 6, 4, 4, 3, 1, 0,
	·		1 1

Test	Expected	Got
	3, 3, 7, 9, 7, 9, 5, 1, 5,	3, 3, 7, 9, 7, 9, 5, 1, 5,
	1, 5, 2, 0, 3, 1, 4, 9, 2,	1, 5, 2, 0, 3, 1, 4, 9, 2,
	6, 5, 3, 2, 7, 8, 1, 6, 7,	6, 5, 3, 2, 7, 8, 1, 6, 7,
	0, 2, 7, 6, 1, 5, 8, 3, 5,	0, 2, 7, 6, 1, 5, 8, 3, 5,
	0, 4, 7, 9, 8, 8, 2, 6, 9,	0, 4, 7, 9, 8, 8, 2, 6, 9,
	9, 7, 8, 3, 8, 8, 0, 8, 6,	9, 7, 8, 3, 8, 8, 0, 8, 6,
	4, 5, 7, 2, 0, 7, 3, 5, 5,	4, 5, 7, 2, 0, 7, 3, 5, 5,
	3, 5, 6, 2, 3, 3, 1, 2, 4,	3, 5, 6, 2, 3, 3, 1, 2, 4,
	4, 4, 5, 5, 4, 9, 7, 0, 8,	4, 4, 5, 5, 4, 9, 7, 0, 8,
	0, 4, 3, 0, 9, 7, 7, 8, 1,	0, 4, 3, 0, 9, 7, 7, 8, 1,
	3, 7, 1, 5, 4, 7]	3, 7, 1, 5, 4, 7]

	Test	Expected	Got
~	int arr[] = {3, 1, 6, 8, 6, 6, 1, 5, 7, 1, 7, 6,	[3, 1, 6, 8, 6, 6, 1, 5, 7,	[3, 1, 6, 8, 6, 6, 1, 5, 7,
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	1, 6, 9, 3, 8, 8, 0, 4, 9, 7, 4, 7, 6, 3, 4, 9,	7, 6, 4, 0, 3, 8, 9, 4, 7,	7, 6, 4, 0, 3, 8, 9, 4, 7,
	9, 6, 4, 1, 1, 4, 8, 8, 1, 6, 5, 2, 8, 5, 3, 9, 0, 8, 9, 1, 6, 9, 3, 9, 6, 9, 9, 9, 3, 8, 8, 3,	1, 1, 6, 9, 3, 8, 8, 0, 4, 9, 7, 4, 7, 6, 3, 4, 9, 9,	1, 1, 6, 9, 3, 8, 8, 0, 4, 9, 7, 4, 7, 6, 3, 4, 9, 9,
	0, 7, 8, 9, 1, 9, 2, 5, 6, 4, 3, 1, 9, 1, 0, 0,	6, 4, 1, 1, 4, 8, 8, 1, 6,	6, 4, 1, 1, 4, 8, 8, 1, 6,
	8, 2, 1, 7, 7, 3, 3, 5, 6, 0, 5, 5, 6, 9, 7, 0,	5, 2, 8, 5, 3, 9, 0, 8, 9,	5, 2, 8, 5, 3, 9, 0, 8, 9,
	9, 4, 5, 8, 6, 5, 1, 3, 4, 7, 4, 4, 6, 6, 9, 8,	1, 6, 9, 3, 9, 6, 9, 9, 9,	1, 6, 9, 3, 9, 6, 9, 9, 9,
	2, 4, 1, 0, 6, 0, 6, 0, 6, 2, 4, 5, 6, 5, 6, 2,	3, 8, 8, 3, 0, 7, 8, 9, 1,	3, 8, 8, 3, 0, 7, 8, 9, 1,
	1, 1, 6, 4, 0, 6, 8, 7, 3, 9, 6, 2, 6, 9, 3, 6, 0, 6, 2, 2, 3, 5, 0, 5, 6, 5, 1, 4, 0, 8, 9, 4,	9, 2, 5, 6, 4, 3, 1, 9, 1, 0, 0, 8, 2, 1, 7, 7, 3, 3,	9, 2, 5, 6, 4, 3, 1, 9, 1, 0, 0, 8, 2, 1, 7, 7, 3, 3,
	3, 1, 9, 6, 3, 0, 0, 2, 0, 8, 8, 2, 1, 1, 8, 0,	5, 6, 0, 5, 5, 6, 9, 7, 0,	5, 6, 0, 5, 5, 6, 9, 7, 0,
	0, 9, 2, 9, 7, 3, 3, 9, 8, 6, 4, 7, 7, 4, 7, 4,	9, 4, 5, 8, 6, 5, 1, 3, 4,	9, 4, 5, 8, 6, 5, 1, 3, 4,
	8, 3, 9, 3, 0, 7, 0, 2, 0, 6, 4, 1, 2, 2, 1, 4,	7, 4, 4, 6, 6, 9, 8, 2, 4,	7, 4, 4, 6, 6, 9, 8, 2, 4,
	4, 7, 7, 0, 9, 4, 4, 6, 3, 8, 6, 4, 2, 8, 2, 8, 9, 1, 7, 1, 4, 2, 9, 7, 8, 3, 4, 5, 7, 5, 0, 0,	1, 0, 6, 0, 6, 0, 6, 2, 4, 5, 6, 5, 6, 2, 1, 1, 6, 4,	1, 0, 6, 0, 6, 0, 6, 2, 4, 5, 6, 5, 6, 2, 1, 1, 6, 4,
	1, 8, 9, 7, 8, 1, 4, 2, 9, 3, 9, 1, 4, 2, 1, 1,	0, 6, 8, 7, 3, 9, 6, 2, 6,	0, 6, 8, 7, 3, 9, 6, 2, 6,
	3, 6, 1, 4, 2, 1, 5, 9, 9, 9, 2, 0, 3, 2, 5, 7,	9, 3, 6, 0, 6, 2, 2, 3, 5,	9, 3, 6, 0, 6, 2, 2, 3, 5,
	5, 4, 8, 0, 1, 7, 5, 2, 5, 2, 2, 1, 2, 8, 2, 9,	0, 5, 6, 5, 1, 4, 0, 8, 9,	0, 5, 6, 5, 1, 4, 0, 8, 9,
	7, 7, 7, 6, 6, 8, 3, 8, 2, 0, 8, 1, 9, 1, 6, 8,	4, 3, 1, 9, 6, 3, 0, 0, 2,	4, 3, 1, 9, 6, 3, 0, 0, 2,
	6, 6, 6, 4, 3, 0, 6, 8, 7, 0, 5, 0, 0, 2, 8, 6, 7, 0, 4, 0, 3, 1, 9, 9, 4, 6, 7, 0, 8, 4, 1, 0,	0, 8, 8, 2, 1, 1, 8, 0, 0, 9, 2, 9, 7, 3, 3, 9, 8, 6,	0, 8, 8, 2, 1, 1, 8, 0, 0, 9, 2, 9, 7, 3, 3, 9, 8, 6,
	8, 0, 7, 7, 1, 0, 7, 2, 5, 7, 5, 2, 9, 5, 3, 1,	4, 7, 7, 4, 7, 4, 8, 3, 9,	4, 7, 7, 4, 7, 4, 8, 3, 9,
	8, 2, 8, 3, 4, 9, 3, 9, 3, 5, 6, 9, 9, 0, 9, 6,	3, 0, 7, 0, 2, 0, 6, 4, 1,	3, 0, 7, 0, 2, 0, 6, 4, 1,
	3, 7, 8, 6, 1, 2, 2, 3, 8, 2, 4, 5, 0, 5, 8, 3,	2, 2, 1, 4, 4, 7, 7, 0, 9,	2, 2, 1, 4, 4, 7, 7, 0, 9,
	2, 8, 6, 9, 0, 5, 7, 4, 2, 2, 9, 9, 2, 7, 0, 5,	4, 4, 6, 3, 8, 6, 4, 2, 8,	4, 4, 6, 3, 8, 6, 4, 2, 8,
	0, 8, 7, 1, 6, 3, 3, 7, 9, 9, 9, 8, 6, 9, 9, 8, 9, 2, 8, 6, 4, 2, 1, 6, 6, 0, 9, 8, 2, 1, 9, 4,	2, 8, 9, 1, 7, 1, 4, 2, 9, 7, 8, 3, 4, 5, 7, 5, 0, 0,	2, 8, 9, 1, 7, 1, 4, 2, 9, 7, 8, 3, 4, 5, 7, 5, 0, 0,
	7, 7, 9, 6, 7, 0, 6, 6, 6, 7, 0, 2, 6, 2, 3, 4,	1, 8, 9, 7, 8, 1, 4, 2, 9,	1, 8, 9, 7, 8, 1, 4, 2, 9,
	0, 8, 1, 8, 4, 8, 3, 8, 6, 8, 6, 5, 9, 5, 9, 8,	3, 9, 1, 4, 2, 1, 1, 3, 6,	3, 9, 1, 4, 2, 1, 1, 3, 6,
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	6, 9, 9, 0, 9, 7, 3, 4, 7, 4, 0, 6, 6, 0, 6, 6, 6, 3, 1, 9, 3, 9, 1, 2, 0, 3, 5, 4, 5, 8, 2, 0, 5,	0, 3, 2, 5, 7, 5, 4, 8, 0, 1, 7, 5, 2, 5, 2, 2, 1, 2,	0, 3, 2, 5, 7, 5, 4, 8, 0, 1, 7, 5, 2, 5, 2, 2, 1, 2,
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	9, 8, 4, 5, 2, 8, 2, 3, 3, 6, 5, 5, 8, 2, 6, 5,	9, 5, 3, 1, 8, 2, 8, 3, 4,	9, 5, 3, 1, 8, 2, 8, 3, 4,
	0, 4, 9, 9, 7, 6, 3, 1, 7, 5, 0, 0, 4, 9, 6, 0,	9, 3, 9, 3, 5, 6, 9, 9, 0,	9, 3, 9, 3, 5, 6, 9, 9, 0,
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	8, 2, 9, 0, 6, 3, 3, 5, 5, 0, 8, 4, 7, 4, 4, 5,	2, 8, 6, 9, 0, 5, 7, 4, 2,	2, 8, 6, 9, 0, 5, 7, 4, 2,
	9, 2, 7, 7, 8, 8, 8, 0, 8, 8, 0, 4, 8, 4, 4, 7,	2, 9, 9, 2, 7, 0, 5, 0, 8,	2, 9, 9, 2, 7, 0, 5, 0, 8,
	6, 2, 5, 2, 7, 3, 7, 0, 9, 8, 1, 5, 0, 3, 8, 4,	7, 1, 6, 3, 3, 7, 9, 9, 9,	7, 1, 6, 3, 3, 7, 9, 9, 9,
	0, 7, 5, 0, 5, 4, 5, 4, 9, 6, 3, 5, 8, 1, 0, 8, 0, 8, 2, 6, 5, 3, 4, 8, 8, 9, 5, 3, 8, 1, 0, 2,	8, 6, 9, 9, 8, 9, 2, 8, 6, 4, 2, 1, 6, 6, 0, 9, 8, 2,	8, 6, 9, 9, 8, 9, 2, 8, 6, 4, 2, 1, 6, 6, 0, 9, 8, 2,
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	4, 1, 6, 4, 7, 4, 0, 3, 3, 2, 4, 7, 9, 0, 6, 2,	6, 6, 6, 7, 0, 2, 6, 2, 3,	6, 6, 6, 7, 0, 2, 6, 2, 3,
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	7, 4, 5, 9, 9, 8, 8, 4, 5, 6, 6, 3, 3, 7, 6, 1, 6, 7, 9, 9, 5, 4, 0, 7, 0, 4, 5, 8, 2, 8, 8, 1,	6, 8, 6, 5, 9, 5, 9, 8, 9, 1, 1, 6, 7, 6, 1, 1, 3, 9,	6, 8, 6, 5, 9, 5, 9, 8, 9, 1, 1, 6, 7, 6, 1, 1, 3, 9,
	2, 0, 9, 1, 8, 1, 8, 4, 7, 3, 1, 1, 2, 3, 0, 4,	3, 4, 1, 6, 8, 5, 6, 9, 9,	3, 4, 1, 6, 8, 5, 6, 9, 9,
	7, 5, 4, 4, 3, 5, 4, 6, 6, 0, 3, 7, 4, 4, 5, 7,	0, 9, 7, 3, 4, 7, 4, 0, 6,	0, 9, 7, 3, 4, 7, 4, 0, 6,
	7, 3, 9, 1, 8, 0, 0, 5, 0, 9, 8, 3, 3, 3, 6, 6,	6, 0, 6, 6, 3, 1, 9, 3, 9,	6, 0, 6, 6, 3, 1, 9, 3, 9,
	6, 6, 2, 5, 8, 1, 5, 2, 8, 2, 1, 4, 6, 2, 5, 8,	1, 2, 0, 3, 5, 4, 5, 8, 2,	1, 2, 0, 3, 5, 4, 5, 8, 2,
	2, 9, 3, 9, 4, 8, 2, 1, 3, 6, 7, 9, 3, 9, 3, 6, 8, 8, 7, 1, 5, 3, 7, 1, 3, 7, 0, 1, 7, 0, 9, 6,	0, 5, 3, 2, 2, 0, 9, 8, 3, 8, 0, 6, 3, 3, 5, 6, 8, 6,	0, 5, 3, 2, 2, 0, 9, 8, 3, 8, 0, 6, 3, 3, 5, 6, 8, 6,
	2, 8, 0, 1, 8, 6, 6, 4, 5, 1, 3, 3, 9, 1, 1, 9,	2, 9, 9, 1, 0, 9, 6, 4, 6,	2, 9, 9, 1, 0, 9, 6, 4, 6,
	6, 9, 9, 5, 2, 2, 2, 2, 8, 2, 4, 4, 1, 9, 8, 3,	4, 1, 6, 5, 7, 1, 2, 2, 8,	4, 1, 6, 5, 7, 1, 2, 2, 8,
	7, 4, 3, 4, 3, 5, 2, 8, 4, 0, 9, 9, 0, 5, 6, 0,	6, 6, 8, 2, 0, 3, 4, 7, 7,	6, 6, 8, 2, 0, 3, 4, 7, 7,
	1, 9, 0, 5, 6, 7, 7, 5, 4, 7, 3, 5, 0, 3, 2, 2, 2, 9, 0, 0, 6, 1, 9, 1, 7, 1, 3, 4, 6, 9, 6, 1,	3, 3, 2, 3, 4, 5, 2, 8, 7, 1, 7, 7, 7, 9, 7, 0, 4, 7,	3, 3, 2, 3, 4, 5, 2, 8, 7, 1, 7, 7, 7, 9, 7, 0, 4, 7,
	3, 7, 4, 5, 7, 2, 6, 8, 2, 8, 5, 0, 5, 6, 1, 7,	9, 5, 2, 7, 5, 6, 1, 5, 3,	9, 5, 2, 7, 5, 6, 1, 5, 3,
	0, 3, 1, 5, 4, 8, 3, 7, 8, 4, 1, 7, 1, 3, 3, 8,	4, 3, 8, 8, 3, 8, 9, 9, 3,	4, 3, 8, 8, 3, 8, 9, 9, 3,
	9, 0, 1, 4, 2, 1, 3, 8, 3, 0, 8, 9, 1, 3, 3, 8,	7, 7, 7, 9, 3, 7, 8, 6, 5,	7, 7, 7, 9, 3, 7, 8, 6, 5,
	4, 6, 3, 2, 8, 9, 1, 2, 3, 8, 4, 4, 6, 1, 9, 9,	7, 2, 9, 4, 0, 9, 6, 0, 4,	7, 2, 9, 4, 0, 9, 6, 0, 4,
	1, 0, 1, 0, 7, 8, 7, 5, 8, 2, 4, 3, 1, 0, 0, 8, 1, 2, 9, 7, 4, 7, 4, 6, 5, 5, 1, 1, 3, 7, 8, 9,	2, 0, 6, 3, 8, 7, 4, 3, 8, 9, 8, 1, 1, 1, 6, 9, 8, 4,	2, 0, 6, 3, 8, 7, 4, 3, 8, 9, 8, 1, 1, 1, 6, 9, 8, 4,
	-, -, -, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·,	2, 0, 1, 1, 1, 0, 2, 0, 4,	2, 0, 1, 1, 0, 2, 0, 4,

11:14 P	M Singly	Linked List: Xem iại ian iam thư	BK-LMS
	Test	Expected	Got
	6, 3, 0, 9, 7, 9, 6, 1, 2, 7, 2, 1, 2, 8, 0, 1,	5, 2, 8, 2, 3, 3, 6, 5, 5,	5, 2, 8, 2, 3, 3, 6, 5, 5,
	2, 7, 3, 4, 3, 6, 8, 7, 1, 7, 6, 7, 9, 5, 7, 2,	8, 2, 6, 5, 0, 4, 9, 9, 7,	8, 2, 6, 5, 0, 4, 9, 9, 7,
	8, 1, 1, 8, 7, 4, 6, 5, 7, 7, 0, 3, 8, 0, 5, 3,	6, 3, 1, 7, 5, 0, 0, 4, 9,	6, 3, 1, 7, 5, 0, 0, 4, 9,
	6, 1, 0, 0, 5, 5, 9, 8, 9, 2, 2, 0, 5, 0, 9, 4,	6, 0, 4, 6, 0, 8, 5, 6, 5,	6, 0, 4, 6, 0, 8, 5, 6, 5,
	4, 6, 8, 5, 9, 7, 1, 4, 6, 4, 5, 1, 5, 2, 2, 7,	3, 8, 0, 4, 5, 6, 2, 8, 6,	3, 8, 0, 4, 5, 6, 2, 8, 6,
	3, 6, 4, 9, 2, 9, 7, 8, 1, 5, 5, 8, 4, 5, 6, 4,	0, 3, 9, 6, 2, 1, 4, 7, 3,	0, 3, 9, 6, 2, 1, 4, 7, 3,
	1, 1, 8, 0, 6, 8, 9, 4, 8, 4, 2, 4, 0, 1, 3, 7,	3, 3, 8, 6, 1, 0, 7, 8, 2,	3, 3, 8, 6, 1, 0, 7, 8, 2,
	6, 5, 7, 8, 3, 6, 8, 7, 8, 3, 3, 8, 9, 9, 9, 1,	9, 0, 6, 3, 3, 5, 5, 0, 8,	9, 0, 6, 3, 3, 5, 5, 0, 8,
	0, 3, 0, 2, 0, 3, 7, 1, 2, 1, 1, 6, 5, 0, 2, 6,	4, 7, 4, 4, 5, 9, 2, 7, 7,	4, 7, 4, 4, 5, 9, 2, 7, 7,
	8, 7, 5, 0, 7, 1, 7, 7, 0, 5, 2, 2, 2, 8, 6, 9,	8, 8, 8, 0, 8, 8, 0, 4, 8,	8, 8, 8, 0, 8, 8, 0, 4, 8,
	4, 7, 7, 7, 0, 0, 4, 9, 7, 5, 8, 5, 5, 4, 5, 2,	4, 4, 7, 6, 2, 5, 2, 7, 3,	4, 4, 7, 6, 2, 5, 2, 7, 3,
	2, 4, 2, 0, 2, 5, 3, 1, 2, 3, 6, 8, 0, 0, 3, 4,	7, 0, 9, 8, 1, 5, 0, 3, 8,	7, 0, 9, 8, 1, 5, 0, 3, 8,
	5, 2, 8,snip, 9, 9, 4, 2, 9, 7, 8, 4, 4,	4, 0, 7, 5, 0, 5, 4, 5, 4,	4, 0, 7, 5, 0, 5, 4, 5, 4,
	9, 7, 4, 0, 8, 3, 2, 8, 0, 8, 7, 1, 9, 4, 2, 5,	9, 6, 3, 5, 8, 1, 0, 8, 0,	9, 6, 3, 5, 8, 1, 0, 8, 0,
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	0, 8, 9, 0, 1, 0, 0, 6, 5, 7, 3, 9, 0, 2, 3, 8,	4, 2, 1, 3, 8, 3, 0, 8, 9,	4, 2, 1, 3, 8, 3, 0, 8, 9,
	3, 2, 9, 1, 3, 8, 2, 4, 5, 2, 5, 6, 1, 4, 7, 1,	1, 3, 3, 8, 4, 6, 3, 2, 8,	1, 3, 3, 8, 4, 6, 3, 2, 8,
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	8, 6, 4, 4, 6, 1, 6, 9, 0, 0, 8, 3, 6, 4, 1, 8,	5, 1, 1, 3, 7, 8, 9, 6, 3,	5, 1, 1, 3, 7, 8, 9, 6, 3,
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	8, 7, 5, 9, 3, 5, 7, 6, 7, 3, 2, 4, 6, 2, 6, 8,	1, 2, 8, 0, 1, 2, 7, 3, 4,	1, 2, 8, 0, 1, 2, 7, 3, 4,
	8, 7, 5, 5, 4, 6, 4, 3, 4, 4, 4, 8, 7, 3, 4, 1,	3, 6, 8, 7, 1, 7, 6, 7, 9,	3, 6, 8, 7, 1, 7, 6, 7, 9,
	3, 8, 1, 4, 4, 7, 8, 6, 9, 6, 8, 2, 4, 6, 7, 5,	5, 7, 2, 8, 1, 1, 8, 7, 4,	5, 7, 2, 8, 1, 1, 8, 7, 4,
	0, 6, 1, 0, 9, 7, 7, 8, 0, 0, 3, 4, 9, 4, 6, 6,	6, 5, 7, 7, 0, 3, 8, 0, 5,	6, 5, 7, 7, 0, 3, 8, 0, 5,
	8, 7, 2, 4, 4, 4, 9, 3, 2, 1, 3, 6, 1, 1, 6, 1,	3, 6, 1, 0, 0, 5, 5, 9, 8,	3, 6, 1, 0, 0, 5, 5, 9, 8,
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	7, 8, 2, 5, 5, 3, 5, 2, 5, 4, 6, 8, 3, 8, 4, 0,	8, 9, 4, 8, 4, 2, 4, 0, 1,	8, 9, 4, 8, 4, 2, 4, 0, 1,
	5, 6, 4, 6, 9, 8, 5, 5, 5, 9, 1, 7, 8, 3, 3, 0,	3, 7, 6, 5, 7, 8, 3, 6, 8,	3, 7, 6, 5, 7, 8, 3, 6, 8,
	8, 9, 6, 6, 2, 8, 1, 6, 1, 2, 5, 4, 7, 9, 5, 0,	7, 8, 3, 3, 8, 9, 9, 9, 1,	7, 8, 3, 3, 8, 9, 9, 9, 1,
	6, 2, 3, 7, 7, 3, 4, 7, 6, 8, 9, 9, 0, 5, 7, 5,	0, 3, 0, 2, 0, 3, 7, 1, 2,	0, 3, 0, 2, 0, 3, 7, 1, 2,
	0, 6, 2, 4, 4, 3, 7, 4, 1, 7, 4, 6, 8, 1, 2, 9,	1, 1, 6, 5, 0, 2, 6, 8, 7,	1, 1, 6, 5, 0, 2, 6, 8, 7,
		I	

1:14 PM Sing	ıy Linked List: Xem işi ian iam tnu	DK-LIVIS
Test	Expected	Got
9, 3, 7, 7, 6, 7, 2, 8, 5, 2, 8, 4, 2, 9, 6, 5,	5, 0, 7, 1, 7, 7, 0, 5, 2,	5, 0, 7, 1, 7, 7, 0, 5, 2,
4, 1, 3, 7, 8, 4, 4, 7, 0, 2, 2, 2, 0, 2, 4, 9,	2, 2, 8, 6, 9, 4, 7, 7, 7,	2, 2, 8, 6, 9, 4, 7, 7, 7,
5, 3, 1, 1, 1, 3, 6, 2, 3, 2, 4, 0, 3, 0, 0, 0,	0, 0, 4, 9, 7, 5, 8, 5, 5,	0, 0, 4, 9, 7, 5, 8, 5, 5,
9, 6, 7, 5, 6, 7, 8, 1, 9, 1, 2, 4, 2, 4, 3, 3,	4, 5, 2, 2, 4, 2, 0, 2, 5,	4, 5, 2, 2, 4, 2, 0, 2, 5,
1, 0, 5, 8, 6, 7, 6, 1, 4, 7, 5, 4, 4, 0, 6, 7,	3, 1, 2, 3, 6, 8, 0, 0, 3,	3, 1, 2, 3, 6, 8, 0, 0, 3,
1, 8, 9, 9, 9, 8, 8, 6, 4, 6, 8, 1, 2, 2, 7, 9, 6, 8, 6, 4, 9, 2, 3, 0, 5, 7, 2, 3, 1, 9, 7, 1,	4, 5, 2, 8, 6, 8, 9, 2,snip 7, 8, 2, 8, 6,	4, 5, 2, 8, 6, 8, 9, 2,snip 7, 8, 2, 8, 6,
7, 0, 3, 9, 5, 7, 2, 1, 5, 6, 1, 5, 3, 8, 0, 1,	3, 4, 1, 0, 2, 4, 7, 0, 2,	3, 4, 1, 0, 2, 4, 7, 0, 2,
1, 0, 6, 1, 5, 1, 5, 5, 9, 8, 9, 0, 5, 5, 8, 8,	4, 8, 2, 6, 2, 1, 0, 5, 1,	4, 8, 2, 6, 2, 1, 0, 5, 1,
2, 6, 6, 7, 7, 9, 5, 6, 4, 2, 3, 3, 0, 5, 8, 4,	5, 0, 6, 1, 0, 9, 8, 6, 9,	5, 0, 6, 1, 0, 9, 8, 6, 9,
7, 1, 5, 2, 3, 4, 3, 8, 6, 4, 0, 9, 8, 3, 8, 4,	5, 7, 5, 3, 6, 0, 5, 9, 0,	5, 7, 5, 3, 6, 0, 5, 9, 0,
3, 7, 9, 4, 3, 1, 7, 8, 6, 5, 8, 5, 6, 4, 0, 6,	9, 9, 0, 3, 0, 9, 3, 9, 6,	9, 9, 0, 3, 0, 9, 3, 9, 6,
6, 2, 9, 3, 9, 8, 5, 4, 7, 3, 7, 8, 9, 7, 9, 5, 3, 2, 4, 1, 2, 2, 9, 1, 9, 0, 4, 3, 6, 1, 6, 1,	5, 3, 2, 8, 9, 0, 0, 7, 5, 1, 1, 2, 1, 4, 0, 2, 0, 7,	5, 3, 2, 8, 9, 0, 0, 7, 5, 1, 1, 2, 1, 4, 0, 2, 0, 7,
1, 5, 2, 8, 6, 0, 9, 0, 6, 9, 0, 3, 0, 9, 8, 7,	1, 4, 5, 5, 6, 2, 6, 1, 0,	1, 4, 5, 5, 6, 2, 6, 1, 0,
3, 3, 1, 0, 7, 2, 1, 3, 3, 7, 7, 6, 9, 1, 3, 8,	4, 0, 7, 1, 3, 3, 4, 5, 0,	4, 0, 7, 1, 3, 3, 4, 5, 0,
5, 6, 2, 8, 8, 3, 7, 3, 4, 7, 6, 6, 8, 5, 1, 7,	7, 1, 0, 9, 8, 7, 0, 0, 8,	7, 1, 0, 9, 8, 7, 0, 0, 8,
8, 1, 5, 3, 7, 9, 6, 3, 8, 4, 8, 0, 4, 7, 7, 2,	2, 5, 3, 2, 7, 4, 9, 0, 6,	2, 5, 3, 2, 7, 4, 9, 0, 6,
9, 2, 6, 2, 8, 7, 7, 5, 9, 4, 4, 3, 0, 6, 2, 2,	0, 7, 4, 7, 2, 8, 6, 3, 9,	0, 7, 4, 7, 2, 8, 6, 3, 9,
6, 5, 4, 4, 7, 8, 0, 7, 5, 8, 5, 6, 7, 2, 5, 3,	7, 0, 6, 3, 9, 6, 7, 7, 4,	7, 0, 6, 3, 9, 6, 7, 7, 4,
4, 6, 4, 4}; int k = 1000;	6, 9, 7, 5, 9, 9, 4, 8, 3, 3, 6, 6, 6, 7, 5, 4, 7, 0,	6, 9, 7, 5, 9, 9, 4, 8, 3, 3, 6, 6, 6, 7, 5, 4, 7, 0,
LLNode* head = LLNode::createWithIterators(arr,	6, 2, 9, 7, 4, 2, 3, 9, 3,	6, 2, 9, 7, 4, 2, 3, 9, 3,
<pre>arr + sizeof(arr) / sizeof(int));</pre>	9, 6, 0, 7, 8, 0, 0, 7, 9,	9, 6, 0, 7, 8, 0, 0, 7, 9,
LLNode::printList(head);	1, 6, 0, 7, 1, 6, 1, 0, 9,	1, 6, 0, 7, 1, 6, 1, 0, 9,
cout << "\n";	1, 0, 9, 1, 8, 3, 6, 8, 1,	1, 0, 9, 1, 8, 3, 6, 8, 1,
LLNode* newhead = rotateLinkedList(head, k);	2, 8, 5, 9, 7, 1, 1, 5, 4,	2, 8, 5, 9, 7, 1, 1, 5, 4,
LLNode::printList(newhead);	5, 7, 5, 9, 4, 9, 5, 4, 2,	5, 7, 5, 9, 4, 9, 5, 4, 2,
	4, 4, 1, 1, 3, 1, 9, 8, 6, 4, 1, 2, 2, 4, 2, 9, 8, 2,	4, 4, 1, 1, 3, 1, 9, 8, 6, 4, 1, 2, 2, 4, 2, 9, 8, 2,
	4, 9, 0, 3, 6, 1, 1, 8, 4,	4, 9, 0, 3, 6, 1, 1, 8, 4,
	2, 0, 7, 6, 7, 3, 9, 7, 0,	2, 0, 7, 6, 7, 3, 9, 7, 0,
	9, 8, 6, 0, 5, 1, 8, 0, 2,	9, 8, 6, 0, 5, 1, 8, 0, 2,
	9, 5, 5, 8, 5, 3, 9, 8, 7,	9, 5, 5, 8, 5, 3, 9, 8, 7,
	0, 4, 8, 2, 2, 6, 8, 4, 1, 4, 7, 2, 2, 1, 0, 6, 4, 8,	0, 4, 8, 2, 2, 6, 8, 4, 1, 4, 7, 2, 2, 1, 0, 6, 4, 8,
	9, 5, 1, 0, 2, 6, 3, 9, 1,	9, 5, 1, 0, 2, 6, 3, 9, 1,
	2, 0, 1, 3, 6, 4, 7, 0, 0,	2, 0, 1, 3, 6, 4, 7, 0, 0,
	5, 6, 7, 3, 2, 6, 8, 8, 5,	5, 6, 7, 3, 2, 6, 8, 8, 5,
	4, 8, 4, 5, 0, 2, 8, 1, 2,	4, 8, 4, 5, 0, 2, 8, 1, 2,
	9, 9, 5, 1, 4, 8, 8, 1, 3,	9, 9, 5, 1, 4, 8, 8, 1, 3,
	9, 2, 8, 6, 1, 0, 8, 7, 3, 7, 3, 6, 9, 7, 1, 7, 9, 3,	9, 2, 8, 6, 1, 0, 8, 7, 3, 7, 3, 6, 9, 7, 1, 7, 9, 3,
	3, 8, 7, 9, 1, 9, 1, 9, 4,	3, 8, 7, 9, 1, 9, 1, 9, 4,
	1, 1, 0, 3, 6, 7, 5, 3, 7,	1, 1, 0, 3, 6, 7, 5, 3, 7,
	8, 8, 1, 4, 9, 0, 3, 9, 9,	8, 8, 1, 4, 9, 0, 3, 9, 9,
	6, 4, 8, 2, 6, 7, 9, 0, 3,	6, 4, 8, 2, 6, 7, 9, 0, 3,
	9, 0, 6, 8, 9, 2, 1, 2, 5,	9, 0, 6, 8, 9, 2, 1, 2, 5,
	0, 8, 8, 4, 5, 6, 3, 7, 5, 2, 0, 0, 2, 1, 2, 4, 7, 8,	0, 8, 8, 4, 5, 6, 3, 7, 5, 2, 0, 0, 2, 1, 2, 4, 7, 8,
	3, 0, 8, 2, 1, 4, 5, 1, 7,	3, 0, 8, 2, 1, 4, 5, 1, 7,
	6, 4, 1, 3, 5, 3, 7, 3, 9,	6, 4, 1, 3, 5, 3, 7, 3, 9,
	2, 8, 8, 0, 6, 1, 0, 2, 5,	2, 8, 8, 0, 6, 1, 0, 2, 5,
	3, 2, 1, 4, 4, 1, 6, 2, 8,	3, 2, 1, 4, 4, 1, 6, 2, 8,
	7, 2, 8, 1, 4, 7, 0, 6, 0,	7, 2, 8, 1, 4, 7, 0, 6, 0,
	5, 5, 0, 9, 6, 0, 6, 8, 6, 7, 7, 3, 9, 0, 2, 9, 0, 6,	5, 5, 0, 9, 6, 0, 6, 8, 6, 7, 7, 3, 9, 0, 2, 9, 0, 6,
	7, 4, 7, 3, 3, 1, 1, 3, 7,	7, 4, 7, 3, 3, 1, 1, 3, 7,
	0, 3, 2, 4, 1, 6, 4, 2, 9,	0, 3, 2, 4, 1, 6, 4, 2, 9,
	3, 8, 3, 1, 3, 4, 8, 4, 3,	3, 8, 3, 1, 3, 4, 8, 4, 3,
	6, 3, 4, 6, 7, 8, 3, 0, 7,	6, 3, 4, 6, 7, 8, 3, 0, 7,
	2, 3, 3, 9, 6, 8, 3, 0, 3,	2, 3, 3, 9, 6, 8, 3, 0, 3,
	1, 2, 2, 7, 7, 1, 9, 7, 8, 0, 6, 1, 7, 4, 2, 1, 5, 5,	1, 2, 2, 7, 7, 1, 9, 7, 8, 0, 6, 1, 7, 4, 2, 1, 5, 5,
	1, 4, 7, 7, 8, 6, 3, 2, 4,	1, 4, 7, 7, 8, 6, 3, 2, 4,
	7, 4, 3, 5, 0, 4, 5, 5, 9,	7, 4, 3, 5, 0, 4, 5, 5, 9,
	4, 1, 2, 0, 4, 6, 3, 3, 2,	4, 1, 2, 0, 4, 6, 3, 3, 2,
	9, 4, 1, 4, 8, 3, 7, 2, 3,	9, 4, 1, 4, 8, 3, 7, 2, 3,
	3, 4, 5, 9, 0, 1, 0, 8, 5,	3, 4, 5, 9, 0, 1, 0, 8, 5,
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	,, ,, ,, ,, ,, ,, ,, ,, ,, ,,	, , , , , , , , , , , , , , , , , , ,

Test	Expected Got
	0, 8, 8, 7, 3, 6, 2, 3, 0, 0, 8, 8, 7, 3, 6, 2, 3, 0,
	8, 2, 5, 2, 2, 3, 3, 2, 2, 8, 2, 5, 2, 2, 3, 3, 2, 2,
	9, 4, 4, 4, 1, 0, 8, 3, 4, 9, 4, 4, 1, 0, 8, 3, 4,
	8, 9, 1, 1, 0, 8, 2, 6, 0, 8, 9, 1, 1, 0, 8, 2, 6, 0,
	9, 3, 5, 6, 3, 8, 5, 4, 5, 9, 3, 5, 6, 3, 8, 5, 4, 5,
	8, 9, 0, 3, 9, 8, 9, 8, 3, 8, 9, 0, 3, 9, 8, 9, 8, 3,
	5, 4, 5, 4, 3, 8, 0, 3, 4, 5, 4, 5, 4, 3, 8, 0, 3, 4,
	5, 1, 3, 4, 6, 7, 9, 6, 5, 5, 1, 3, 4, 6, 7, 9, 6, 5,
	4, 1, 1, 6, 5, 2, 0, 7, 5, 4, 1, 1, 6, 5, 2, 0, 7, 5,
	3, 7, 5, 1, 4, 4, 9, 6, 0, 3, 7, 5, 1, 4, 4, 9, 6, 0,
	7, 1, 7, 6, 6, 9, 5, 3, 9, 7, 1, 7, 6, 6, 9, 5, 3, 9,
	2, 7, 6, 8, 5, 5, 3, 7, 2, 2, 7, 6, 8, 5, 5, 3, 7, 2,
	4, 7, 5, 4, 0, 9, 4, 9, 3, 4, 7, 5, 4, 0, 9, 4, 9, 3,
	8, 6, 5, 5, 5, 8, 2, 8, 8, 8, 6, 5, 5, 5, 8, 2, 8, 8,
	9, 5, 7, 4, 8, 4, 9, 3, 2, 9, 5, 7, 4, 8, 4, 9, 3, 2,
	2, 6, 0, 6, 4, 4, 5, 9, 4, 2, 6, 0, 6, 4, 4, 5, 9, 4,
	5, 9, 4, 3, 6, 5, 1, 1, 6, 5, 9, 4, 3, 6, 5, 1, 1, 6,
	2, 9, 1, 1, 0, 6, 0, 5, 5, 2, 9, 1, 1, 0, 6, 0, 5, 5,
	8, 5, 7, 4, 9, 6, 3, 5, 7, 8, 5, 7, 4, 9, 6, 3, 5, 7,
	8, 1, 8, 7, 4, 2, 1, 7, 0, 8, 1, 8, 7, 4, 2, 1, 7, 0,
	5, 3, 5, 4, 7, 3, 7, 3, 9, 5, 3, 5, 4, 7, 3, 7, 3, 9,
	2, 3, 0, 5, 1, 9, 9, 1, 3, 2, 3, 0, 5, 1, 9, 9, 1, 3,
	0, 0, 8, 8, 5, 3, 0, 0, 7, 0, 0, 8, 8, 5, 3, 0, 0, 7,
	8, 1, 0, 7, 5, 2, 4, 9, 8, 8, 1, 0, 7, 5, 2, 4, 9, 8,
	6, 0, 3, 2, 6, 4, 0, 5, 1, 6, 0, 3, 2, 6, 4, 0, 5, 1,
	4, 2, 5, 6, 9, 2, 1, 9, 3, 4, 2, 5, 6, 9, 2, 1, 9, 3,
	1, 0, 7, 0, 8, 5, 8, 0, 8, 1, 0, 7, 0, 8, 5, 8, 0, 8,
	5, 6, 5, 4, 4, 2, 1, 6, 5, 5, 6, 5, 4, 4, 2, 1, 6, 5,
	5, 4, 7, 0, 3, 6, 2, 0, 8, 5, 4, 7, 0, 3, 6, 2, 0, 8,
	8, 6, 3, 1, 7, 0, 5, 4, 7, 8, 6, 3, 1, 7, 0, 5, 4, 7,
	7, 0, 9, 1, 5, 4, 4, 1, 9, 7, 0, 9, 1, 5, 4, 4, 1, 9,
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	9, 2, 2, 0, 5, 1, 8, 3, 6, 9, 2, 2, 0, 5, 1, 8, 3, 6, 7, 2, 7, 7, 0, 3, 5, 2, 6, 7, 2, 7, 7, 0, 3, 5, 2, 6,
	7, 2, 7, 7, 0, 3, 5, 2, 6, 7, 2, 7, 7, 0, 3, 5, 2, 6, 8, 4, 6, 2, 7, 0, 1, 5, 3, 8, 4, 6, 2, 7, 0, 1, 5, 3,
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	1, 7, 5, 6, 3, 2, 2, 8, 1, 1, 7, 5, 6, 3, 2, 2, 8, 1,
	8, 7, 0, 6, 7, 3, 4, 7, 4, 8, 7, 0, 6, 7, 3, 4, 7, 4,
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	8, 3, 9, 9, 8, 8, 4, 8, 4, 8, 3, 9, 9, 8, 8, 4, 8, 4,
	6, 4, 1, 7, 3, 8, 4, 3, 1, 6, 4, 1, 7, 3, 8, 4, 3, 1,
	6, 4, 6, 1, 0, 1, 3, 8, 4, 6, 4, 6, 1, 0, 1, 3, 8, 4,
	3, 0, 7, 8, 1, 2, 6, 8, 4, 3, 0, 7, 8, 1, 2, 6, 8, 4,
	7, 4, 8, 8, 9, 3, 6, 6, 9, 7, 4, 8, 8, 9, 3, 6, 6, 9,
	4, 2, 4, 7, 3, 2, 3, 1, 6, 4, 2, 4, 7, 3, 2, 3, 1, 6,
	7, 0, 2, 4, 7, 9, 0, 0, 0, 7, 0, 2, 4, 7, 9, 0, 0, 0,
	4, 0, 2, 4, 0, 7, 8, 0, 5, 4, 0, 2, 4, 0, 7, 8, 0, 5,
	9, 2, 9, 5, 3, 3, 5, 0, 9, 2, 9, 5, 3, 3, 5, 0,
	9, 8, 7, 5, 9, 5, 0, 1, 2, 9, 8, 7, 5, 9, 5, 0, 1, 2,
	4, 7, 4, 9, 9, 4, 2, 9, 7, 4, 7, 4, 9, 9, 4, 2, 9, 7,
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	5, 1, 2, 3, 9, 1, 2, 6, 0, 5, 1, 2, 3, 9, 1, 2, 6, 0,
	5, 0, 9, 1, 6, 7, 6, 6, 6, 5, 0, 9, 1, 6, 7, 6, 6, 6,
	1, 3, 8, 4, 1, 6, 7, 6, 3, 1, 3, 8, 4, 1, 6, 7, 6, 3,
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	0, 6, 4, 4, 0, 9, 8, 6, 5, 0, 6, 4, 4, 0, 9, 8, 6, 5,
	1, 8, 3, 9, 9, 4, 9, 5, 6, 1, 8, 3, 9, 9, 4, 9, 5, 6,
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	8, 8, 0, 7, 8, 2, 9, 7, 2, 8, 8, 8, 0, 7, 8, 2, 9, 7, 2,
	1, 4, 4, 8, 2, 0, 1, 9, 6, 1, 4, 4, 8, 2, 0, 1, 9, 6,
	5, 7, 5, 9, 6, 4, 4, 0, 7, 5, 7, 5, 9, 6, 4, 4, 0, 7,
	9, 7, 0, 9, 1, 6, 5, 2, 6, 9, 7, 0, 9, 1, 6, 5, 2, 6,

Expected	Got
2, 1, 7, 7, 5, 0, 9, 5, 0,	2, 1, 7, 7, 5, 0, 9, 5, 0,
6, 2, 9, 0, 1, 4, 5, 4, 5,	6, 2, 9, 0, 1, 4, 5, 4, 5,
7, 8, 9, 6, 7, 7, 4, 2, 7,	7, 8, 9, 6, 7, 7, 4, 2, 7,
1, 0, 9, 2, 0, 8, 2, 9, 2,	1, 0, 9, 2, 0, 8, 2, 9, 2,
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4, 4, 8, 5, 3, 7, 2, 7, 5,	4, 4, 8, 5, 3, 7, 2, 7, 5,
2, 3, 0, 7, 5, 9, 8, 1, 2,	2, 3, 0, 7, 5, 9, 8, 1, 2,
8, 1, 4, 0, 4, 7, 0, 0, 3,	8, 1, 4, 0, 4, 7, 0, 0, 3,
7, 0, 6, 6, 3, 3, 7, 0, 4,	7, 0, 6, 6, 3, 3, 7, 0, 4,
7, 4, 3, 9, 3, 2, 1, 2, 1,	7, 4, 3, 9, 3, 2, 1, 2, 1,
9, 4, 1, 3, 9, 7, 6, 1, 4,	9, 4, 1, 3, 9, 7, 6, 1, 4,
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7, 1, 8]	7, 1, 8]
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	Test	Expected	Got	
~	int arr[] = {2, 2, 6, 2, 6, 9, 8, 0, 5, 7, 5, 2,	[2, 2, 6, 2, 6, 9, 8, 0, 5,	[2, 2, 6, 2, 6, 9, 8, 0, 5,	~
	0, 3, 3, 5, 1, 0, 6, 0, 0, 4, 3, 8, 1, 0, 7, 7,	7, 5, 2, 0, 3, 3, 5, 1, 0,	7, 5, 2, 0, 3, 3, 5, 1, 0,	
	9, 8, 7, 8, 5, 5, 2, 4, 4, 6, 1, 2, 8, 5, 8, 1, 6, 3, 0, 6, 8, 7, 4, 0, 2, 2, 5, 6, 7, 3, 3, 2,	6, 0, 0, 4, 3, 8, 1, 0, 7, 7, 9, 8, 7, 8, 5, 5, 2, 4,	6, 0, 0, 4, 3, 8, 1, 0, 7, 7, 9, 8, 7, 8, 5, 5, 2, 4,	
	5, 7, 0, 2, 2, 9, 8, 5, 8, 2, 7, 2, 2, 6, 1, 0,	4, 6, 1, 2, 8, 5, 8, 1, 6,	4, 6, 1, 2, 8, 5, 8, 1, 6,	
	4, 2, 2, 7, 6, 8, 5, 5, 7, 7, 7, 7, 0, 0, 6, 6,	3, 0, 6, 8, 7, 4, 0, 2, 2,	3, 0, 6, 8, 7, 4, 0, 2, 2,	
	6, 2, 7, 0, 9, 8, 7, 2, 9, 3, 0, 0, 4, 6, 2, 5,	5, 6, 7, 3, 3, 2, 5, 7, 0,	5, 6, 7, 3, 3, 2, 5, 7, 0,	
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	1, 5, 4, 1, 5, 1, 1, 5, 8, 4, 2, 2, 6, 0, 7, 8, 6, 7, 9, 9, 0, 5, 6, 1, 4, 9, 9, 0, 3, 2, 6, 5,	2, 6, 1, 0, 4, 2, 2, 7, 6, 8, 5, 5, 7, 7, 7, 7, 0, 0,	2, 6, 1, 0, 4, 2, 2, 7, 6, 8, 5, 5, 7, 7, 7, 7, 0, 0,	
	6, 1, 7, 8, 8, 9, 0, 0, 2, 6, 9, 3, 7, 3, 7, 4,	6, 6, 6, 2, 7, 0, 9, 8, 7,	6, 6, 6, 2, 7, 0, 9, 8, 7,	
	9, 1, 9, 2, 7, 8, 2, 8, 2, 7, 7, 9, 1, 4, 4, 0,	2, 9, 3, 0, 0, 4, 6, 2, 5,	2, 9, 3, 0, 0, 4, 6, 2, 5,	
	4, 7, 8, 1, 3, 4, 5, 5, 1, 7, 3, 3, 4, 5, 8, 5,	1, 3, 1, 7, 2, 0, 9, 8, 4,	1, 3, 1, 7, 2, 0, 9, 8, 4,	
	8, 3, 5, 8, 2, 6, 1, 2, 1, 9, 4, 0, 7, 4, 7, 0,	8, 5, 3, 7, 8, 8, 7, 1, 5,	8, 5, 3, 7, 8, 8, 7, 1, 5,	
	1, 5, 6, 8, 8, 3, 1, 7, 4, 0, 9, 6, 2, 9, 6, 9, 6, 7, 6, 0, 1, 7, 6, 7, 4, 7, 9, 1, 0, 4, 7, 3,	4, 1, 5, 1, 1, 5, 8, 4, 2, 2, 6, 0, 7, 8, 6, 7, 9, 9,	4, 1, 5, 1, 1, 5, 8, 4, 2, 2, 6, 0, 7, 8, 6, 7, 9, 9,	
	0, 6, 5, 2, 6, 7, 4, 8, 4, 3, 7, 3, 2, 0, 1, 9,	0, 5, 6, 1, 4, 9, 9, 0, 3,	0, 5, 6, 1, 4, 9, 9, 0, 3,	
	7, 8, 8, 8, 3, 8, 7, 5, 0, 4, 0, 5, 2, 6, 2, 4,	2, 6, 5, 6, 1, 7, 8, 8, 9,	2, 6, 5, 6, 1, 7, 8, 8, 9,	
	2, 9, 8, 7, 0, 2, 9, 4, 0, 7, 4, 8, 3, 2, 1, 0,	0, 0, 2, 6, 9, 3, 7, 3, 7,	0, 0, 2, 6, 9, 3, 7, 3, 7,	
	8, 1, 2, 2, 0, 2, 1, 1, 3, 9, 4, 2, 4, 6, 3, 0, 1, 0, 1, 9, 3, 0, 8, 6, 5, 7, 9, 3, 2, 0, 8, 0,	4, 9, 1, 9, 2, 7, 8, 2, 8, 2, 7, 7, 9, 1, 4, 4, 0, 4,	4, 9, 1, 9, 2, 7, 8, 2, 8, 2, 7, 7, 9, 1, 4, 4, 0, 4,	
	6, 8, 0, 5, 1, 7, 6, 9, 8, 0, 7, 1, 6, 6, 3, 1,	7, 8, 1, 3, 4, 5, 5, 1, 7,	7, 8, 1, 3, 4, 5, 5, 1, 7,	
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	9, 3, 6, 5, 0, 3, 4, 5, 6, 2, 5, 6, 9, 9, 0, 3, 7, 0, 8, 8, 0, 3, 0, 4, 2, 7, 0, 9, 0, 6, 3, 9,	7, 4, 7, 0, 1, 5, 6, 8, 8, 3, 1, 7, 4, 0, 9, 6, 2, 9,	7, 4, 7, 0, 1, 5, 6, 8, 8, 3, 1, 7, 4, 0, 9, 6, 2, 9,	
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	0, 3, 3, 2, 1, 1, 5, 8, 0, 0, 0, 2, 3, 2, 0, 1,	3, 7, 3, 2, 0, 1, 9, 7, 8,	3, 7, 3, 2, 0, 1, 9, 7, 8,	
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	6, 5, 2, 0, 0, 5, 7, 0, 4, 6, 4, 2, 9, 4, 8, 6,	1, 1, 3, 9, 4, 2, 4, 6, 3,	1, 1, 3, 9, 4, 2, 4, 6, 3,	
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	6, 0, 2, 8, 0, 2, 8, 4, 5, 6, 1, 5, 8, 7, 3, 8,	8, 0, 5, 1, 7, 6, 9, 8, 0,	8, 0, 5, 1, 7, 6, 9, 8, 0,	
	0, 9, 9, 3, 5, 4, 8, 2, 6, 1, 7, 8, 1, 8, 0, 2,	7, 1, 6, 6, 3, 1, 2, 3, 1,	7, 1, 6, 6, 3, 1, 2, 3, 1,	
	4, 3, 6, 4, 3, 5, 7, 7, 5, 8, 0, 8, 4, 6, 0, 5,	5, 6, 2, 9, 3, 2, 3, 0, 5,	5, 6, 2, 9, 3, 2, 3, 0, 5,	
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	6, 8, 1, 4, 2, 9, 6, 2, 7, 9, 6, 8, 0, 2, 7, 6,	5, 6, 2, 5, 6, 9, 9, 0, 3,	5, 6, 2, 5, 6, 9, 9, 0, 3,	
	8, 3, 9, 1, 1, 3, 3, 0, 3, 4, 9, 3, 4, 2, 7, 7,	7, 0, 8, 8, 0, 3, 0, 4, 2,	7, 0, 8, 8, 0, 3, 0, 4, 2,	
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	3, 8, 3, 6, 0, 0, 2, 7, 3, 9, 4, 2, 1, 6, 4, 6,	9, 7, 5, 2, 4, 0, 0, 8, 4,	9, 7, 5, 2, 4, 0, 0, 8, 4,	
	8, 9, 6, 0, 4, 2, 0, 8, 2, 8, 8, 7, 0, 4, 4, 9,	4, 4, 9, 9, 4, 7, 6, 1, 9,	4, 4, 9, 9, 4, 7, 6, 1, 9,	
	3, 4, 2, 9, 1, 0, 1, 0, 4, 5, 6, 7, 7, 1, 5, 4,	1, 0, 9, 8, 0, 6, 4, 4, 0,	1, 0, 9, 8, 0, 6, 4, 4, 0,	
	1, 3, 7, 8, 0, 8, 8, 6, 1, 1, 1, 0, 6, 8, 8, 4, 1, 8, 0, 4, 1, 2, 1, 1, 6, 3, 5, 8, 2, 0, 5, 6,	6, 1, 8, 6, 3, 0, 2, 6, 6, 3, 0, 3, 3, 2, 1, 1, 5, 8,	6, 1, 8, 6, 3, 0, 2, 6, 6, 3, 0, 3, 3, 2, 1, 1, 5, 8,	
	8, 5, 9, 5, 1, 0, 0, 6, 7, 6, 0, 0, 0, 4, 9, 6,	0, 0, 0, 2, 3, 2, 0, 1, 3,	0, 0, 0, 2, 3, 2, 0, 1, 3,	
	0, 4, 8, 2, 9, 1, 3, 8, 2, 5, 5, 3, 9, 1, 6, 1,	3, 6, 4, 9, 9, 7, 0, 5, 4,	3, 6, 4, 9, 9, 7, 0, 5, 4,	
	8, 8, 4, 8, 8, 0, 8, 9, 9, 3, 7, 7, 6, 0, 8, 1,	5, 5, 9, 4, 5, 5, 3, 4, 2,	5, 5, 9, 4, 5, 5, 3, 4, 2,	
	9, 1, 0, 3, 5, 4, 9, 1, 5, 6, 8, 6, 3, 4, 6, 3, 3, 3, 8, 1, 6, 5, 0, 8, 4, 1, 6, 9, 1, 8, 0, 5,	7, 8, 3, 6, 7, 0, 2, 4, 7, 0, 6, 9, 9, 1, 8, 3, 4, 0,	7, 8, 3, 6, 7, 0, 2, 4, 7, 0, 6, 9, 9, 1, 8, 3, 4, 0,	
	5, 8, 6, 1, 8, 7, 7, 9, 6, 8, 4, 7, 5, 5, 0, 8,	7, 6, 5, 2, 8, 0, 7, 7, 7,	7, 6, 5, 2, 8, 0, 7, 7, 7,	
	8, 2, 1, 6, 3, 0, 2, 8, 9, 7, 7, 6, 5, 8, 3, 3,	7, 2, 4, 9, 3, 3, 5, 0, 1,	7, 2, 4, 9, 3, 3, 5, 0, 1,	
	9, 3, 9, 5, 1, 7, 1, 1, 8, 1, 7, 8, 6, 1, 0, 3,	2, 8, 7, 1, 0, 3, 5, 0, 4,	2, 8, 7, 1, 0, 3, 5, 0, 4,	
	4, 1, 7, 0, 4, 1, 6, 2, 2, 1, 7, 7, 0, 0, 2, 5,	6, 5, 2, 0, 0, 5, 7, 0, 4,	6, 5, 2, 0, 0, 5, 7, 0, 4,	
	4, 9, 8, 1, 3, 1, 1, 3, 2, 7, 8, 0, 9, 3, 4, 3, 2, 9, 8, 7, 2, 5, 4, 0, 4, 8, 5, 3, 9, 3, 9, 6,	6, 4, 2, 9, 4, 8, 6, 7, 1, 3, 2, 1, 4, 8, 8, 1, 1, 6,	6, 4, 2, 9, 4, 8, 6, 7, 1, 3, 2, 1, 4, 8, 8, 1, 1, 6,	
	2, 7, 1, 7, 7, 5, 6, 1, 7, 7, 7, 8, 4, 6, 0, 2,	1, 6, 3, 0, 9, 2, 5, 1, 8,	1, 6, 3, 0, 9, 2, 5, 1, 8,	
	3, 5, 8, 0, 1, 4, 9, 6, 1, 7, 5, 3, 3, 8, 2, 6,	8, 2, 9, 4, 0, 0, 1, 8, 4,	8, 2, 9, 4, 0, 0, 1, 8, 4,	
	2, 7, 3, 0, 1, 3, 8, 7, 0, 9, 7, 4, 4, 4, 6, 0,	0, 4, 2, 6, 0, 2, 8, 0, 2,	0, 4, 2, 6, 0, 2, 8, 0, 2,	
	8, 2, 6, 9, 9, 5, 3, 7, 9, 4, 8, 8, 6, 1, 7, 9, 4, 8, 0, 0, 2, 5, 8, 6, 3, 3, 1, 2, 5, 5, 2, 9,	8, 4, 5, 6, 1, 5, 8, 7, 3, 8, 0, 9, 9, 3, 5, 4, 8, 2,	8, 4, 5, 6, 1, 5, 8, 7, 3, 8, 0, 9, 9, 3, 5, 4, 8, 2,	
	4, 8, 8, 6, 9, 1, 3, 9, 5, 3, 0, 7, 2, 1, 2, 4,	6, 1, 7, 8, 1, 8, 0, 2, 4,	6, 1, 7, 8, 1, 8, 0, 2, 4,	
	4, 6, 0, 2, 8, 7, 1, 6, 7, 4, 5, 1, 9, 4, 4, 7,	3, 6, 4, 3, 5, 7, 7, 5, 8,	3, 6, 4, 3, 5, 7, 7, 5, 8,	
	, , , , , , , , , , , , , , , , , , , ,			

_	9.7	Linked List: Xem iại ian iam thư	T I
Te	est	Expected	Got
1,	0, 7, 0, 5, 0, 3, 1, 2, 1, 9, 3, 4, 4, 0, 0,	3, 8, 8, 2, 6, 4, 0, 0, 1,	3, 8, 8, 2, 6, 4, 0, 0, 1,
2,	, 9, 6, 3, 8, 9, 6, 7, 6, 9, 5, 3, 2, 1, 3, 0,	0, 8, 6, 0, 0, 9, 3, 3, 2,	0, 8, 6, 0, 0, 9, 3, 3, 2,
2,	, 7, 9, 8, 8, 5, 4, 4, 2, 6, 5, 4, 2, 0, 0, 2,	1, 3, 4, 0, 7, 1, 0, 2, 3,	1, 3, 4, 0, 7, 1, 0, 2, 3,
	, 8, 8, 7, 9, 7, 9, 8, 8, 2, 6, 0, 9, 0, 2, 6,	1, 2, 3, 4, 6, 1, 5, 7, 3,	1, 2, 3, 4, 6, 1, 5, 7, 3,
	, 9, 2, 9, 2, 5, 8, 6, 8, 0, 1, 5, 0, 6, 9, 7,	6, 3, 2, 2, 4, 4, 0, 8, 1,	6, 3, 2, 2, 4, 4, 0, 8, 1,
	, 2, 1, 5, 6, 1, 7, 0, 0, 7, 0, 0, 2, 8, 3, 3, , 9, 8, 9, 8, 9, 9, 1, 7, 6, 2, 5, 1, 2, 5, 7,	6, 8, 1, 4, 2, 9, 6, 2, 7, 9, 6, 8, 0, 2, 7, 6, 8, 3,	6, 8, 1, 4, 2, 9, 6, 2, 7,
	, 8, 2, 8, 7, 7, 6, 1, 2, 8, 2, 5, 8, 0, 5, 7,	9, 1, 1, 3, 3, 0, 3, 4, 9,	9, 6, 8, 0, 2, 7, 6, 8, 3, 9, 1, 1, 3, 3, 0, 3, 4, 9,
	, 7, 0, 2, 5, 5, 0, 3, 1, 8, 5, 7, 6, 8, 0, 0,	3, 4, 2, 7, 7, 2, 5, 1, 4,	3, 4, 2, 7, 7, 2, 5, 1, 4,
1	, 1, 9, 0, 1, 3, 3, 3, 5, 5, 0, 6, 8, 5, 4, 7,	8, 0, 4, 0, 7, 2, 8, 8, 7,	8, 0, 4, 0, 7, 2, 8, 8, 7,
	, 8, 0, 3, 5, 9, 2, 8, 7, 8, 4, 5, 7, 6, 4, 9,	1, 4, 8, 6, 6, 6, 3, 2, 1,	1, 4, 8, 6, 6, 6, 3, 2, 1,
7	, 6, 1, 1, 1, 6, 0, 1, 0, 7, 5, 1, 9, 9, 2, 7,	9, 5, 9, 6, 7, 4, 1, 6, 3,	9, 5, 9, 6, 7, 4, 1, 6, 3,
4,	, 9, 9,snip 2, 6, 9, 2, 8, 3, 8, 0, 6,	6, 3, 8, 3, 6, 0, 0, 2, 7,	6, 3, 8, 3, 6, 0, 0, 2, 7,
8,	, 3, 5, 0, 9, 6, 0, 7, 2, 5, 0, 3, 2, 8, 8, 2,	3, 9, 4, 2, 1, 6, 4, 6, 8,	3, 9, 4, 2, 1, 6, 4, 6, 8,
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	, 9, 8, 9, 7, 9, 2, 7, 0, 4, 9, 0, 6, 2, 8, 1,	8, 7, 0, 4, 4, 9, 3, 4, 2,	8, 7, 0, 4, 4, 9, 3, 4, 2,
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	, 6, 7, 7, 9, 6, 0, 4, 7, 8, 4, 4, 2, 7, 0, 0,	8, 8, 6, 1, 1, 1, 0, 6, 8, 8, 4, 1, 8, 0, 4, 1, 2, 1,	8, 8, 6, 1, 1, 1, 0, 6, 8, 8, 4, 1, 8, 0, 4, 1, 2, 1,
	, 0, 8, 8, 5, 7, 6, 2, 8, 5, 5, 3, 7, 1, 2, 8,	1, 6, 3, 5, 8, 2, 0, 5, 6,	1, 6, 3, 5, 8, 2, 0, 5, 6,
	4, 1, 8, 1, 8, 7, 8, 4, 0, 1, 6, 3, 0, 2, 3,	8, 5, 9, 5, 1, 0, 0, 6, 7,	8, 5, 9, 5, 1, 0, 0, 6, 7,
	, 0, 8, 2, 0, 7, 8, 7, 1, 3, 3, 5, 0, 0, 1, 5,	6, 0, 0, 0, 4, 9, 6, 0, 4,	6, 0, 0, 0, 4, 9, 6, 0, 4,
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3,	, 3, 4, 9, 9, 5, 7, 2, 3, 7, 8, 4, 2, 4, 0, 0,	8, 0, 8, 9, 9, 3, 7, 7, 6,	8, 0, 8, 9, 9, 3, 7, 7, 6,
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6,	, 0, 4, 5, 0, 9, 5, 3, 2, 6, 4, 0, 4, 5, 1, 4,	0, 3, 4, 1, 7, 0, 4, 1, 6,	0, 3, 4, 1, 7, 0, 4, 1, 6,
1 .	5, 1, 6, 9, 6, 6, 0, 3, 1, 6, 9, 9, 6, 5, 1,	2, 2, 1, 7, 7, 0, 0, 2, 5,	2, 2, 1, 7, 7, 0, 0, 2, 5,
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l _ '	, 8, 5, 2, 4, 5, 2, 4, 5, 4, 8, 6, 9, 2, 4, 9, , 4, 6, 1, 3, 0, 8, 6, 1, 1, 2, 6, 8, 4, 9, 4,	3, 9, 3, 9, 6, 2, 7, 1, 7, 7, 5, 6, 1, 7, 7, 7, 8, 4,	3, 9, 3, 9, 6, 2, 7, 1, 7, 7, 5, 6, 1, 7, 7, 7, 8, 4,
	, 6, 5, 0, 3, 6, 4, 1, 8, 7, 7, 2, 3, 6, 2, 8,	6, 0, 2, 3, 5, 8, 0, 1, 4,	6, 0, 2, 3, 5, 8, 0, 1, 4,
	3, 1, 7, 8, 2, 4, 0, 7, 7, 4, 9, 8, 5, 8, 1,	9, 6, 1, 7, 5, 3, 3, 8, 2,	9, 6, 1, 7, 5, 3, 3, 8, 2,
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	, 2, 7, 4, 2, 4, 9, 2, 3, 8, 8, 5, 0, 1, 3, 0,	0, 9, 7, 4, 4, 4, 6, 0, 8,	0, 9, 7, 4, 4, 4, 6, 0, 8,
3,	, 8, 6, 5, 1, 8, 1, 3, 8, 6, 5, 6, 5, 4, 8, 3,	2, 6, 9, 9, 5, 3, 7, 9, 4,	2, 6, 9, 9, 5, 3, 7, 9, 4,
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١.	, 8, 0, 4, 2, 9, 0, 4, 2, 7, 9, 6, 9, 9, 1, 5, , 4, 1, 4, 5, 5, 1, 0, 1, 3, 9, 6, 0, 4, 5, 5,	2, 4, 4, 6, 0, 2, 8, 7, 1, 6, 7, 4, 5, 1, 9, 4, 4, 7,	2, 4, 4, 6, 0, 2, 8, 7, 1, 6, 7, 4, 5, 1, 9, 4, 4, 7,
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l _	, 6, 5, 2, 0, 3, 3, 5, 3, 5, 5, 9, 5, 7, 6, 1,	4, 4, 2, 6, 5, 4, 2, 0, 0,	4, 4, 2, 6, 5, 4, 2, 0, 0,
١.	, 1, 0, 7, 1, 8, 6, 7, 7, 8, 3, 9, 0, 0, 6, 0,	2, 7, 8, 8, 7, 9, 7, 9, 8,	2, 7, 8, 8, 7, 9, 7, 9, 8,
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	, 6, 1, 5, 6, 2, 2, 4, 6, 0, 2, 6, 7, 8, 0, 5, 5 1 1 2 3 4 7 5 7 0 8 2 4 4 0	9, 2, 9, 2, 5, 8, 6, 8, 0,	9, 2, 9, 2, 5, 8, 6, 8, 0,
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0,		1, 2, 8, 2, 5, 8, 0, 5, 7, 0, 7, 0, 2, 5, 5, 0, 3, 1,	1, 2, 8, 2, 5, 8, 0, 5, 7, 0, 7, 0, 2, 5, 5, 0, 3, 1,

1:14 PM Sing	ly Linked List: Xem iại ian iam thư	DK-LIVIS
Test	Expected	Got
9, 3, 5, 1, 2, 1, 0, 8, 1, 7, 9, 8, 8, 3, 7, 0,	9, 0, 1, 3, 3, 3, 5, 5, 0,	9, 0, 1, 3, 3, 3, 5, 5, 0,
8, 0, 8, 2, 9, 9, 1, 0, 8, 2, 9, 7, 2, 1, 1, 7,	6, 8, 5, 4, 7, 7, 8, 0, 3,	6, 8, 5, 4, 7, 7, 8, 0, 3,
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0, 0, 9, 6, 4, 7, 2, 2, 4, 2, 5, 7, 8, 9, 3, 0,	0, 1, 0, 7, 5, 1, 9, 9, 2,	0, 1, 0, 7, 5, 1, 9, 9, 2,
1, 3, 9, 7, 4, 7, 9, 7, 0, 6, 1, 2, 9, 8, 3, 9,	7, 4, 9, 9, 0, 6, 3, 1,	7, 4, 9, 9, 0, 6, 3, 1,
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0, 8, 4, 1, 7, 6, 8, 9, 7, 2, 4, 9, 1, 3, 7, 9,	2, 5, 3, 8, 6, 8, 4, 0, 7,	2, 5, 3, 8, 6, 8, 4, 0, 7,
8, 6, 0, 4, 3, 2, 6, 9, 3, 0, 8, 0, 0, 2, 4, 4,	5, 6, 1, 4, 5, 2, 6, 5, 2,	5, 6, 1, 4, 5, 2, 6, 5, 2,
9, 3, 4, 9, 1, 4, 2, 2, 9, 5, 7, 8, 9, 7, 0, 9,	9, 1, 5, 1, 3, 8, 9, 0, 7,	9, 1, 5, 1, 3, 8, 9, 0, 7,
5, 4, 7, 2, 1, 3, 3, 2, 7, 6, 0, 0, 1, 2, 7, 3,	7, 4, 9, 4, 4, 7, 0, 0, 9,	7, 4, 9, 4, 4, 7, 0, 0, 9,
2, 8, 7, 1, 0, 6, 8, 8, 8, 2, 8, 9, 5, 6, 5, 0,	0, 7, 9, 5, 4, 8, 5, 9, 1,	0, 7, 9, 5, 4, 8, 5, 9, 1,
5, 9, 7, 2, 2, 3, 9, 3, 1, 8, 6, 9, 1, 1, 4, 9, 0, 9, 1, 3, 1, 9, 1, 0, 5, 3, 6, 9, 0, 3, 6, 5,	8, 8, 9, 7, 1, 6, 2, 8, 9, 0, 4, 1, 8, 1, 3, 3, 1, 6,	8, 8, 9, 7, 1, 6, 2, 8, 9, 0, 4, 1, 8, 1, 3, 3, 1, 6,
6, 1, 0, 7, 4, 2, 3, 3, 1, 4, 7, 3, 8, 2, 5, 6,	4, 7, 0, 0, 3, 2, 5, 9, 0,	4, 7, 0, 0, 3, 2, 5, 9, 0,
8, 4, 8, 6, 7, 4, 8, 3, 7, 4, 7, 1, 4, 0, 3, 8,	5, 9, 7, 1, 1, 9, 6, 3, 4,	5, 9, 7, 1, 1, 9, 6, 3, 4,
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4, 1, 8, 0, 7, 5, 0, 2, 7, 8, 0, 9, 4, 5, 2, 0,	9, 6, 8, 5, 0, 8, 2, 9, 1,	9, 6, 8, 5, 0, 8, 2, 9, 1,
9, 6, 4, 7, 0}; int k = 990;	3, 7, 9, 5, 2, 1, 8, 0, 5, 9, 4, 9, 5, 6, 3, 2, 8, 2,	3, 7, 9, 5, 2, 1, 8, 0, 5, 9, 4, 9, 5, 6, 3, 2, 8, 2,
LLNode* head = LLNode::createWithIterators(arr,	8, 5, 8, 8, 7, 1, 4, 4, 6,	8, 5, 8, 8, 7, 1, 4, 4, 6,
<pre>arr + sizeof(arr) / sizeof(int));</pre>	2, 6, 1, 7, 0, 4, 9, 9, 6,	2, 6, 1, 7, 0, 4, 9, 9, 6,
LLNode::printList(head);	3, 1, 3, 3, 3, 5, 8, 7, 2,	3, 1, 3, 3, 3, 5, 8, 7, 2,
cout << "\n";	5, 1, 3, 8, 2, 8, 1, 5, 2,	5, 1, 3, 8, 2, 8, 1, 5, 2,
<pre>LLNode* newhead = rotateLinkedList(head, k); LLNode::printList(newhead);</pre>	0, 6, 6, 5, 5, 4, 5, 7, 9,	0, 6, 6, 5, 5, 4, 5, 7, 9,
LENoueprinterse(newneau),	3, 5, 3, 1, 6, 9, 0, 9, 5, 8, 8, 4, 6, 0, 9, 4, 0, 8,	3, 5, 3, 1, 6, 9, 0, 9, 5, 8, 8, 4, 6, 0, 9, 4, 0, 8,
	1, 2, 3, 9, 9, 6, 9, 2, 8,	1, 2, 3, 9, 9, 6, 9, 2, 8,
	6, 5, 4, 9, 2, 4, 2, 3, 1,	6, 5, 4, 9, 2, 4, 2, 3, 1,
	8, 6, 8, 3, 3, 5, 4, 7, 1,	8, 6, 8, 3, 3, 5, 4, 7, 1,
	1, 2, 7, 5, 8, 7, 7, 2, 3,	1, 2, 7, 5, 8, 7, 7, 2, 3,
	5, 3, 4, 7, 2, 8, 5, 6, 9, 7, 1, 4, 0, 0, 3, 6, 3, 0,	5, 3, 4, 7, 2, 8, 5, 6, 9, 7, 1, 4, 0, 0, 3, 6, 3, 0,
	4, 4, 0, 4, 3, 7, 1, 8, 5,	4, 4, 0, 4, 3, 7, 1, 8, 5,
	1, 3, 0, 9, 0, 2, 2, 5, 3,	1, 3, 0, 9, 0, 2, 2, 5, 3,
	3, 8, 7, 9, 3, 9, 5, 9, 0,	3, 8, 7, 9, 3, 9, 5, 9, 0,
	7, 7, 0, 2, 9, 8, 4, 0, 6,	7, 7, 0, 2, 9, 8, 4, 0, 6,
	0, 4, 2, 3, 3, 4, 9, 7, 2, 8, 3, 1, 9, 2, 7, 9, 8, 7,	0, 4, 2, 3, 3, 4, 9, 7, 2, 8, 3, 1, 9, 2, 7, 9, 8, 7,
	5, 7, 1, 9, 3, 9, 4, 2, 9,	5, 7, 1, 9, 3, 9, 4, 2, 9,
	1, 1, 0, 4, 6, 3, 8, 6, 9,	1, 1, 0, 4, 6, 3, 8, 6, 9,
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	4, 3, 3, 6, 8, 3, 7, 4, 5, 4, 7, 7, 5, 1, 6, 8, 2, 8,	4, 3, 3, 6, 8, 3, 7, 4, 5, 4, 7, 7, 5, 1, 6, 8, 2, 8,
	0, 8, 0, 8, 8, 7, 3, 6, 5,	0, 8, 0, 8, 8, 7, 3, 6, 5,
	2, 4, 3, 9, 8, 7, 6, 3, 0,	2, 4, 3, 9, 8, 7, 6, 3, 0,
	4, 4, 6, 2, 3, 5, 6, 0, 9,	4, 4, 6, 2, 3, 5, 6, 0, 9,
	2, 1, 9, 4, 8, 9, 8, 9, 1,	2, 1, 9, 4, 8, 9, 8, 9, 1,
	1, 5, 7, 8, 0, 0, 1, 1, 2, 7, 8, 9, 7, 2, 3, 2, 8, 9,	1, 5, 7, 8, 0, 0, 1, 1, 2, 7, 8, 9, 7, 2, 3, 2, 8, 9,
	5, 1, 8, 9, 9, 5, 2, 2, 0,	5, 1, 8, 9, 9, 5, 2, 2, 0,
	6, 5, 6, 9, 5, 2, 6, 2, 3,	6, 5, 6, 9, 5, 2, 6, 2, 3,
	7, 4, 2, 6, 1, 9, 8, 0, 0,	7, 4, 2, 6, 1, 9, 8, 0, 0,
	4, 7, 2, 1, 6, 1, 8, 6, 7,	4, 7, 2, 1, 6, 1, 8, 6, 7,
	1, 2, 6, 1, 4, 1, 6, 2, 1, 9, 5, 0, 0, 4, 6, 2, 5, 3,	1, 2, 6, 1, 4, 1, 6, 2, 1, 9, 5, 0, 0, 4, 6, 2, 5, 3,
	3, 0, 5, 0, 2, 2, 7, 6, 1,	3, 0, 5, 0, 2, 2, 7, 6, 1,
	1, 3, 9, 5, 6, 0, 3, 4, 2,	1, 3, 9, 5, 6, 0, 3, 4, 2,
	8, 3, 7, 2, 9, 6, 1, 8, 3,	8, 3, 7, 2, 9, 6, 1, 8, 3,
	1, 3, 8, 5, 1, 9, 0, 0, 4,	1, 3, 8, 5, 1, 9, 0, 0, 4,
	3, 4, 6, 4, 6, 7, 8, 5, 2, 5, 6, 1, 6, 8, 5, 2, 1, 1,	3, 4, 6, 4, 6, 7, 8, 5, 2, 5, 6, 1, 6, 8, 5, 2, 1, 1,
	0, 4, 7, 0, 4, 9, 1, 4, 2,	0, 4, 7, 0, 4, 9, 1, 4, 2,
	1, 4, 4, 5, 7, 2, 1, 2, 5,	1, 4, 4, 5, 7, 2, 1, 2, 5,
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	., 0, 0, 1, 2, 0, 0, 0, 2,	., 5, 5, 2, 2, 5, 6, 6, 2,

Test	Expected Got
	9, 2, 6, 5, 5, 5, 1, 0, 5, 9, 2, 6, 5, 5, 5, 1, 0, 5,
	1, 9, 6, 2, 2, 3, 0, 7, 6, 1, 9, 6, 2, 2, 3, 0, 7, 6,
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	0, 1, 8, 0, 9, 2, 4, 9, 8, 0, 1, 8, 0, 9, 2, 4, 9, 8,
	3, 6, 3, 9, 2, 2, 6, 5, 7, 3, 6, 3, 9, 2, 2, 6, 5, 7,
	3, 5, 0, 6, 6, 8, 4, 6, 7, 3, 5, 0, 6, 6, 8, 4, 6, 7,
	8, 6, 9, 4, 1, 3, 2, 1, 8, 8, 6, 9, 4, 1, 3, 2, 1, 8,
	0, 0, 7, 2, 1, 5, 3, 4, 3, 0, 0, 7, 2, 1, 5, 3, 4, 3, 2, 4, 1, 3, 0, 3, 9, 8, 6, 2, 4, 1, 3, 0, 3, 9, 8, 6,
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8, 4, 1,	
	1, 5, 2, 4, 9, 9, 2, 2, 5, 0, 6, 2, 4, 9, 9, 4, 2, 4, 9, 5, 7, 5, 9, 9, 1, 1, 8, 0, 8, 9, 6, 3, 9, 8, 4, 1,

	Test	Expected	Got	
~	int arr[] = {9, 9, 7, 1, 0, 8, 1, 7, 1, 6, 9, 1,	[9, 9, 7, 1, 0, 8, 1, 7, 1,	[9, 9, 7, 1, 0, 8, 1, 7, 1,	~
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	3, 4, 2, 0, 1, 4, 6, 2, 9, 0, 9, 9, 0, 2, 7, 3, 5, 9, 8, 2, 5, 4, 3, 4, 6, 3, 8, 1, 2, 0, 3, 3,	7, 0, 0, 0, 2, 1, 9, 5, 5, 3, 3, 4, 2, 0, 1, 4, 6, 2,	7, 0, 0, 0, 2, 1, 9, 5, 5, 3, 3, 4, 2, 0, 1, 4, 6, 2,	
	9, 6, 3, 4, 5, 4, 9, 3, 6, 5, 2, 5, 0, 1, 3, 3,	9, 0, 9, 9, 0, 2, 7, 3, 5,	9, 0, 9, 9, 0, 2, 7, 3, 5,	
	0, 5, 9, 2, 6, 5, 4, 9, 6, 4, 7, 5, 0, 3, 4, 3,	9, 8, 2, 5, 4, 3, 4, 6, 3,	9, 8, 2, 5, 4, 3, 4, 6, 3,	
	9, 2, 7, 5, 5, 5, 2, 7, 5, 3, 4, 9, 3, 5, 1, 1,	8, 1, 2, 0, 3, 3, 9, 6, 3,	8, 1, 2, 0, 3, 3, 9, 6, 3,	
	4, 1, 9, 9, 0, 8, 4, 6, 4, 2, 1, 0, 5, 4, 0, 4, 4, 0, 0, 8, 4, 5, 3, 7, 0, 7, 1, 6, 0, 2, 8, 6,	4, 5, 4, 9, 3, 6, 5, 2, 5, 0, 1, 3, 3, 0, 5, 9, 2, 6,	4, 5, 4, 9, 3, 6, 5, 2, 5, 0, 1, 3, 3, 0, 5, 9, 2, 6,	
	8, 1, 6, 5, 6, 5, 7, 7, 8, 1, 7, 3, 1, 7, 1, 9,	5, 4, 9, 6, 4, 7, 5, 0, 3,	5, 4, 9, 6, 4, 7, 5, 0, 3,	
	2, 4, 6, 2, 1, 8, 8, 4, 0, 9, 0, 8, 8, 6, 6, 8,	4, 3, 9, 2, 7, 5, 5, 5, 2,	4, 3, 9, 2, 7, 5, 5, 5, 2,	
	8, 2, 2, 1, 2, 2, 8, 7, 8, 4, 3, 6, 4, 1, 0, 9,	7, 5, 3, 4, 9, 3, 5, 1, 1,	7, 5, 3, 4, 9, 3, 5, 1, 1,	
	1, 4, 0, 6, 1, 6, 1, 7, 6, 1, 9, 6, 5, 5, 9, 4, 7, 8, 8, 5, 4, 9, 2, 7, 1, 1, 6, 9, 6, 9, 8, 7,	4, 1, 9, 9, 0, 8, 4, 6, 4, 2, 1, 0, 5, 4, 0, 4, 4, 0,	4, 1, 9, 9, 0, 8, 4, 6, 4, 2, 1, 0, 5, 4, 0, 4, 4, 0,	
	8, 8, 0, 3, 0, 8, 6, 0, 3, 3, 5, 1, 9, 4, 5, 2,	0, 8, 4, 5, 3, 7, 0, 7, 1,	0, 8, 4, 5, 3, 7, 0, 7, 1,	
	8, 6, 3, 0, 3, 9, 5, 2, 4, 2, 4, 1, 4, 1, 3, 7,	6, 0, 2, 8, 6, 8, 1, 6, 5,	6, 0, 2, 8, 6, 8, 1, 6, 5,	
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	7, 0, 3, 5, 3, 2, 1, 0, 8, 4, 0, 8, 8, 0, 7, 5,	8, 6, 0, 3, 3, 5, 1, 9, 4,	8, 6, 0, 3, 3, 5, 1, 9, 4,	
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1:14 PI	Singly	Linked List: Xem iại Ian Iam thư	DIX-LIVIO
	Test	Expected	Got
	5, 0, 3, 2, 5, 7, 7, 4, 0, 8, 3, 4, 3, 2, 3, 0,	0, 1, 7, 2, 5, 5, 6, 1, 7,	0, 1, 7, 2, 5, 5, 6, 1, 7,
	5, 6, 0, 2, 5, 7, 0, 4, 2, 3, 0, 9, 1, 9, 3, 7,	1, 0, 7, 4, 0, 5, 1, 3, 9,	1, 0, 7, 4, 0, 5, 1, 3, 9,
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	7, 8, 4, 0, 6, 4, 9, 5, 4, 5, 3, 7, 3, 3, 7, 2,	2, 2, 4, 8, 2, 5, 6, 5, 6,	2, 2, 4, 8, 2, 5, 6, 5, 6,
	1, 6, 3, 4, 6, 3, 1, 5, 9, 7, 3, 6, 2, 0, 9, 7,	0, 2, 1, 7, 8, 7, 7, 0, 2,	0, 2, 1, 7, 8, 7, 7, 0, 2,
	0, 0, 3, 1, 5, 6, 3, 8, 2, 1, 6, 3, 4, 8, 9, 2, 3, 5, 9, 1, 4, 6, 9, 5, 8, 6, 6, 3, 4, 7, 2, 3,	8, 4, 2, 2, 7, 6, 8, 5, 0, 9, 5, 0, 0, 0, 9, 9, 5, 3,	8, 4, 2, 2, 7, 6, 8, 5, 0, 9, 5, 0, 0, 0, 9, 9, 5, 3,
	7, 0, 2, 2, 7, 6, 8, 9, 9, 7, 2, 0, 9, 0, 3, 9,	7, 2, 0, 8, 9, 4, 5, 0, 5,	7, 2, 0, 8, 9, 4, 5, 0, 5,
	6, 5, 9, 4, 3, 6, 8, 4, 3, 1, 0, 7, 2, 7, 3, 9,	9, 2, 6, 2, 5, 3, 3, 5, 2,	9, 2, 6, 2, 5, 3, 3, 5, 2,
	3, 2, 0, 1, 9, 2, 3, 9, 1, 3, 3, 6, 5, 6, 5, 5,	2, 8, 3, 0, 3, 9, 7, 8, 3,	2, 8, 3, 0, 3, 9, 7, 8, 3,
	5, 9, 1, 4, 6, 5, 4, 3, 2, 8, 7, 0, 1, 4, 4, 8,	2, 8, 6, 9, 6, 6, 6, 5, 1,	2, 8, 6, 9, 6, 6, 6, 5, 1,
	9, 7, 4, 1, 1, 9, 4, 1, 0, 9, 5, 8, 6, 6, 9, 1,	7, 3, 3, 7, 1, 9, 3, 5, 1,	7, 3, 3, 7, 1, 9, 3, 5, 1,
	5, 6, 0,snip 9, 5, 6, 1, 4, 6, 9, 4, 3,	4, 3, 4, 2, 0, 2, 0, 1, 0,	4, 3, 4, 2, 0, 2, 0, 1, 0,
	9, 1, 1, 9, 6, 7, 6, 3, 5, 9, 1, 7, 4, 9, 6, 9,	2, 1, 6, 3, 2, 9, 8, 3, 2,	2, 1, 6, 3, 2, 9, 8, 3, 2,
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	5, 1, 8, 0, 2, 7, 4, 2, 4, 2, 9, 6, 6, 4, 6, 7,	2, 6, 4, 9, 5, 0, 1, 1, 2,	2, 6, 4, 9, 5, 0, 1, 1, 2,
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	6, 8, 7, 5, 1, 2, 5, 0, 5, 8, 8, 1, 8, 6, 0, 0,	9, 3, 2, 8, 8, 3, 7, 5, 2,	9, 3, 2, 8, 8, 3, 7, 5, 2,
	4, 0, 1, 3, 0, 2, 9, 1, 4, 9, 7, 2, 4, 8, 5, 0,	9, 3, 7, 5, 4, 7, 4, 9, 2,	9, 3, 7, 5, 4, 7, 4, 9, 2,
	5, 4, 9, 4, 1, 6, 8, 9, 0, 8, 0, 0, 1, 7, 0, 4,	6, 9, 9, 2, 8, 3, 6, 7, 9,	6, 9, 9, 2, 8, 3, 6, 7, 9,
	7, 2, 4, 2, 6, 5, 3, 1, 4, 3, 8, 8, 9, 7, 7, 6,	6, 9, 6, 6, 1, 5, 0, 7, 5,	6, 9, 6, 6, 1, 5, 0, 7, 5,
	9, 5, 0, 7, 2, 4, 6, 4, 6, 0, 8, 9, 1, 2, 7, 6,	6, 7, 2, 2, 7, 3, 7, 5, 4,	6, 7, 2, 2, 7, 3, 7, 5, 4,
	8, 1, 3, 2, 4, 1, 9, 3, 8, 4, 2, 6, 2, 5, 7, 8, 2, 7, 5, 7, 2, 2, 5, 6, 6, 3, 0, 6, 8, 3, 6, 8,	1, 5, 9, 3, 6, 5, 9, 3, 9, 4, 0, 9, 2, 0, 9, 0, 4, 9,	1, 5, 9, 3, 6, 5, 9, 3, 9, 4, 0, 9, 2, 0, 9, 0, 4, 9,
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	6, 0, 1, 1, 3, 1, 6, 1, 0, 3, 0, 6, 3, 8, 1, 0,	5, 4, 5, 6, 3, 3, 6, 8, 1,	5, 4, 5, 6, 3, 3, 6, 8, 1,
	1, 0, 2, 2, 7, 1, 1, 1, 4, 6, 2, 2, 0, 8, 6, 6,	0, 6, 1, 5, 7, 2, 9, 3, 1,	0, 6, 1, 5, 7, 2, 9, 3, 1,
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	9, 9, 4, 8, 7, 8, 4, 7, 1, 3, 7, 0, 8, 3, 9, 3,	1, 7, 8, 4, 0, 6, 4, 9, 5,	1, 7, 8, 4, 0, 6, 4, 9, 5,
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	8, 7, 4, 4, 8, 9, 7, 9, 4, 1, 4, 6, 5, 3, 2, 8,	4, 8, 9, 2, 3, 5, 9, 1, 4,	4, 8, 9, 2, 3, 5, 9, 1, 4,
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	3, 7, 1, 7, 8, 9, 7, 6, 2, 8, 7, 8, 3, 2, 6, 3,	1, 0, 7, 2, 7, 3, 9, 3, 2,	1, 0, 7, 2, 7, 3, 9, 3, 2,

1:14 PM Sing	y Linked List: Xem iại Ian Iam thư	BK-LIMS
Test	Expected	Got
7, 0, 2, 5, 5, 1, 4, 1, 6, 2, 9, 5, 9, 4, 3, 2,	0, 1, 9, 2, 3, 9, 1, 3, 3,	0, 1, 9, 2, 3, 9, 1, 3, 3,
8, 7, 4, 8, 5, 1, 2, 9, 5, 0, 7, 3, 1, 7, 0, 8,	6, 5, 6, 5, 5, 5, 9, 1, 4,	6, 5, 6, 5, 5, 5, 9, 1, 4,
3, 6, 5, 8, 5, 2, 7, 5, 0, 3, 0, 7, 3, 0, 6, 1,	6, 5, 4, 3, 2, 8, 7, 0, 1,	6, 5, 4, 3, 2, 8, 7, 0, 1,
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7, 5, 4, 1, 1, 0, 4, 7, 6, 1, 6, 8, 9, 6, 3, 2, 1, 5, 1, 0, 2, 8, 6, 6, 6, 2, 3, 5, 2, 6, 7, 1,	1, 5, 6, 0, 8, 0, 3, 3,snip 3, 0, 7, 6, 6,	1, 5, 6, 0, 8, 0, 3, 3,snip 3, 0, 7, 6, 6,
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2, 0, 2, 9, 9, 6, 8, 4, 0, 9, 5, 6, 0, 8, 7, 1,	1, 1, 6, 7, 5, 6, 3, 4, 0,	1, 1, 6, 7, 5, 6, 3, 4, 0,
3, 1, 3, 1, 7, 3, 5, 2, 7, 2, 4, 2, 4, 4, 3, 7, 0, 8, 2, 1, 2, 0, 5, 6, 3, 6, 9, 6, 4, 7, 1, 7,	5, 9, 8, 4, 0, 9, 8, 8, 8, 2, 3, 7, 5, 5, 5, 5, 7, 2,	5, 9, 8, 4, 0, 9, 8, 8, 8, 2, 3, 7, 5, 5, 5, 5, 7, 2,
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8, 8, 8, 0, 5, 8, 9, 0, 9, 0, 7, 0, 2, 6, 2, 3,	7, 3, 5, 8, 0, 9, 8, 5, 3,	7, 3, 5, 8, 0, 9, 8, 5, 3,
8, 1, 6, 5}; int k = 11111;	2, 6, 4, 4, 1, 6, 3, 1, 5, 9, 9, 7, 9, 4, 4, 2, 8, 3,	2, 6, 4, 4, 1, 6, 3, 1, 5, 9, 9, 7, 9, 4, 4, 2, 8, 3,
LLNode* head = LLNode::createWithIterators(arr,	6, 0, 9, 8, 5, 1, 2, 3, 3,	6, 0, 9, 8, 5, 1, 2, 3, 3,
<pre>arr + sizeof(arr) / sizeof(int));</pre>	7, 5, 7, 0, 1, 2, 8, 3, 4,	7, 5, 7, 0, 1, 2, 8, 3, 4,
LLNode::printList(head);	4, 9, 3, 0, 2, 7, 3, 2, 6,	4, 9, 3, 0, 2, 7, 3, 2, 6,
cout << "\n";	4, 5, 3, 4, 9, 7, 1, 5, 8,	4, 5, 3, 4, 9, 7, 1, 5, 8,
<pre>LLNode* newhead = rotateLinkedList(head, k);</pre>	7, 9, 9, 1, 7, 3, 1, 3, 5,	7, 9, 9, 1, 7, 3, 1, 3, 5,
LLNode::printList(newhead);	4, 4, 5, 4, 4, 8, 2, 1, 0,	4, 4, 5, 4, 4, 8, 2, 1, 0,
	5, 2, 3, 8, 2, 9, 2, 4, 3, 3, 7, 8, 1, 5, 5, 0, 4, 5,	5, 2, 3, 8, 2, 9, 2, 4, 3, 3, 7, 8, 1, 5, 5, 0, 4, 5,
	2, 7, 7, 0, 8, 0, 4, 1, 9,	2, 7, 7, 0, 8, 0, 4, 1, 9,
	2, 0, 1, 6, 3, 9, 8, 3, 8,	2, 0, 1, 6, 3, 9, 8, 3, 8,
	3, 7, 1, 2, 5, 9, 1, 2, 9,	3, 7, 1, 2, 5, 9, 1, 2, 9,
	7, 4, 2, 4, 5, 5, 7, 9, 6,	7, 4, 2, 4, 5, 5, 7, 9, 6,
	9, 0, 6, 8, 0, 5, 3, 9, 1,	9, 0, 6, 8, 0, 5, 3, 9, 1, 9, 9, 5, 6, 1, 0, 6, 2, 0,
	9, 9, 5, 6, 1, 0, 6, 2, 0, 8, 1, 1, 2, 3, 5, 6, 8, 6,	8, 1, 1, 2, 3, 5, 6, 8, 6,
	6, 4, 8, 7, 5, 4, 2, 7, 6,	6, 4, 8, 7, 5, 4, 2, 7, 6,
	8, 0, 9, 2, 9, 5, 3, 3, 0,	8, 0, 9, 2, 9, 5, 3, 3, 0,
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	8, 8, 8, 4, 5, 1, 2, 8, 6,	8, 8, 8, 4, 5, 1, 2, 8, 6,
	9, 6, 9, 2, 7, 6, 9, 9, 4,	9, 6, 9, 2, 7, 6, 9, 9, 4,
	0, 8, 0, 4, 3, 5, 2, 0, 3,	0, 8, 0, 4, 3, 5, 2, 0, 3,
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	9, 8, 1, 7, 4, 9, 0, 2, 6,	9, 8, 1, 7, 4, 9, 0, 2, 6,
	8, 1, 9, 9, 1, 3, 4, 5, 4, 1, 1, 7, 5, 2, 0, 4, 3, 5,	8, 1, 9, 9, 1, 3, 4, 5, 4, 1, 1, 7, 5, 2, 0, 4, 3, 5,
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	6, 3, 9, 0, 7, 7, 4, 7, 4,	6, 3, 9, 0, 7, 7, 4, 7, 4,
	3, 8, 2, 6, 4, 0, 5, 8, 8,	3, 8, 2, 6, 4, 0, 5, 8, 8,
	7, 2, 7, 3, 2, 3, 8, 7, 1,	7, 2, 7, 3, 2, 3, 8, 7, 1,
	3, 3, 7, 2, 2, 1, 6, 3, 4,	3, 3, 7, 2, 2, 1, 6, 3, 4,
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	7, 0, 6, 8, 1, 5, 2, 5, 6,	7, 0, 6, 8, 1, 5, 2, 5, 6,
	2, 1, 2, 4, 9, 2, 6, 0, 2,	2, 1, 2, 4, 9, 2, 6, 0, 2,
	8, 0, 9, 9, 4, 7, 5, 4, 6,	8, 0, 9, 9, 4, 7, 5, 4, 6,
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	0, 9, 8, 5, 7, 3, 4, 8, 0,	0, 9, 8, 5, 7, 3, 4, 8, 0,
	4, 1, 1, 0, 9, 8, 4, 1, 7,	4, 1, 1, 0, 9, 8, 4, 1, 7,
	3, 1, 1, 2, 5, 4, 4, 6, 2,	3, 1, 1, 2, 5, 4, 4, 6, 2,
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	4, 3, 4, 5, 4, 3, 0, 3, 7,	7, 3, 8, 5, 1, 1, 7, 2, 2, 4, 3, 4, 5, 4, 3, 0, 3, 7,

Test	, T1	1:14 P	VI Singly	Linked List: Xem lại lân làm thứ	BK-LIMS
7, 8, 4, 7, 4, 9, 5, 6, 4, 5, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 5, 2, 6, 5,			Test	Expected	Got
7, 8, 4, 7, 4, 9, 5, 6, 4, 5, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 2, 6, 5, 5, 2, 6, 5,				2, 0, 9, 3, 4, 2, 4, 3, 5,	2, 0, 9, 3, 4, 2, 4, 3, 5,
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	5, 1, 5, 4, 5, 9, 6, 6, 8,	5, 1, 5, 4, 5, 9, 6, 6, 8,
	8, 7, 0, 7, 2, 4, 4, 4, 3,	8, 7, 0, 7, 2, 4, 4, 4, 3,
	1, 4, 5, 9, 8, 0, 8, 4, 9,	1, 4, 5, 9, 8, 0, 8, 4, 9,
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	4, 3, 7, 9, 6, 9, 6, 9, 6,	4, 3, 7, 9, 6, 9, 6, 9, 6,
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	Test	Expected	Got	
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	2, 5, 1, 9, 8, 4, 4, 9, 9, 0, 5, 9, 0, 4, 1, 3,	0, 5, 9, 0, 7, 4, 9, 7, 5,	0, 5, 9, 0, 7, 4, 9, 7, 5,	

11:14 P	14 PM Singly Linked List: Xem iqi ian iam thu' BK-LMS			
	Test	Expected	Got	
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	3, 4, 2, 4, 9, 1, 1, 8, 4, 7, 4, 0, 6, 2, 2, 0,	4, 2, 1, 6, 2, 5, 4, 5, 9,	4, 2, 1, 6, 2, 5, 4, 5, 9,	
	0, 2, 8, 6, 7, 5, 6, 0, 4, 6, 1, 2, 1, 3, 7, 4,	6, 2, 6, 3, 5, 6, 3, 6, 5,	6, 2, 6, 3, 5, 6, 3, 6, 5,	
	5, 3, 8, 3, 0, 3, 0, 5, 2, 0, 9, 7, 3, 0, 5, 1,	1, 3, 4, 2, 9, 8, 5, 6, 8,	1, 3, 4, 2, 9, 8, 5, 6, 8,	
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	6, 3, 8, 0, 3, 4, 9, 7, 0, 9, 0, 4, 6, 3, 6, 1,	1, 4, 1, 4, 8, 9, 2, 2, 9,	1, 4, 1, 4, 8, 9, 2, 2, 9,	
	1, 5, 8, 7, 8, 2, 1, 1, 2, 7, 1, 2, 8, 7, 5, 1,	1, 1, 7, 3, 9, 6, 2, 6, 3,	1, 1, 7, 3, 9, 6, 2, 6, 3,	
	7, 9, 3, 7, 0, 0, 3, 8, 0, 7, 9, 6, 8, 7, 4, 0, 3, 0, 5, 8, 6, 4, 2, 0, 0, 8, 0, 7, 8, 0, 2, 7,	8, 9, 0, 2, 7, 9, 5, 6, 2, 0, 4, 0, 4, 2, 7, 1, 4, 3,	8, 9, 0, 2, 7, 9, 5, 6, 2, 0, 4, 0, 4, 2, 7, 1, 4, 3,	
	8, 4, 0, 6, 5, 9, 2, 2, 8, 4, 5, 6, 0, 1, 5, 2,	0, 7, 0, 2, 0, 9, 3, 9, 5,	0, 7, 0, 2, 0, 9, 3, 9, 5,	
	6, 2, 3, 4, 2, 6, 7, 1, 1, 2, 7, 2, 3, 9, 2, 2,	2, 2, 8, 4, 2, 0, 0, 5, 8,	2, 2, 8, 4, 2, 0, 0, 5, 8,	
	2, 1, 6, 5, 0, 0, 8, 2, 1, 8, 9, 8, 5, 1, 2, 0,	7, 5, 3, 6, 7, 7, 1, 5, 3,	7, 5, 3, 6, 7, 7, 1, 5, 3,	
	7, 1, 7, 4, 3, 7, 7, 2, 6, 7, 2, 4, 4, 9, 3, 9,	3, 9, 4, 9, 1, 3, 8, 5, 8,	3, 9, 4, 9, 1, 3, 8, 5, 8,	
	5, 3, 0, 0, 2, 7, 4, 9, 3, 9, 9, 6, 2, 8, 0, 4,	1, 1, 9, 8, 1, 0, 4, 9, 4,	1, 1, 9, 8, 1, 0, 4, 9, 4,	
	9, 6, 3, 0, 2, 5, 2, 2, 6, 3, 6, 0, 3, 4, 3, 9,	6, 5, 4, 8, 4, 4, 4, 3, 1,	6, 5, 4, 8, 4, 4, 4, 3, 1,	
	0, 6, 4, 3, 0, 3, 5, 8, 9, 5, 6, 5, 1, 7, 0, 1, 0, 9, 7, 9, 5, 0, 3, 4, 3, 4, 1, 1, 2, 0, 1, 0,	6, 5, 7, 5, 3, 4, 2, 4, 9, 1, 1, 8, 4, 7, 4, 0, 6, 2,	6, 5, 7, 5, 3, 4, 2, 4, 9, 1, 1, 8, 4, 7, 4, 0, 6, 2,	
	7, 7, 5, 0, 3, 3, 7, 1, 0, 7, 4, 2, 5, 4, 9, 4,	2, 0, 0, 2, 8, 6, 7, 5, 6,	2, 0, 0, 2, 8, 6, 7, 5, 6,	
	3, 4, 9, 3, 6, 8, 6, 3, 5, 9, 5, 9, 6, 9, 7, 2,	0, 4, 6, 1, 2, 1, 3, 7, 4,	0, 4, 6, 1, 2, 1, 3, 7, 4,	
	1, 6, 5, 4, 5, 3, 8, 3, 2, 0, 1, 8, 1, 9, 4, 6,	5, 3, 8, 3, 0, 3, 0, 5, 2,	5, 3, 8, 3, 0, 3, 0, 5, 2,	
	2, 3, 6, 5, 8, 3, 5, 8, 3, 3, 1, 9, 0, 9, 1, 6,	0, 9, 7, 3, 0, 5, 1, 8, 5,	0, 9, 7, 3, 0, 5, 1, 8, 5,	
I		I	ı I	

1:14 PM Sing	ıy Linked List: Xem işi ian iam tnu	BK-LIMS
Test	Expected	Got
1, 9, 2, 6, 4, 7, 6, 0, 2, 8, 0, 8, 7, 7, 4, 8,	2, 9, 7, 4, 0, 9, 8, 5, 1,	2, 9, 7, 4, 0, 9, 8, 5, 1,
4, 8, 5, 4, 4, 5, 9, 6, 3, 6, 1, 0, 7, 2, 8, 2,	0, 8, 1, 8, 1, 3, 9, 1, 8,	0, 8, 1, 8, 1, 3, 9, 1, 8,
9, 8, 7, 9, 1, 8, 4, 7, 5, 2, 1, 4, 4, 3, 2, 3,	7, 2, 6, 0, 9, 0, 5, 2, 3,	7, 2, 6, 0, 9, 0, 5, 2, 3,
8, 3, 0, 5, 1, 2, 4, 2, 1, 3, 9, 9, 8, 2, 2, 5,	6, 0, 6, 0, 6, 6, 8, 7, 3,	6, 0, 6, 0, 6, 6, 8, 7, 3,
6, 2, 4, 1, 7, 0, 1, 6, 1, 0, 9, 4, 7, 9, 9, 8,	6, 3, 8, 3, 0, 4, 6, 5, 6,	6, 3, 8, 3, 0, 4, 6, 5, 6,
8, 8, 9, 3, 5, 7, 7, 2, 5, 0, 3, 9, 9, 4, 2, 5,	4, 3, 4, 7, 8, 7, 8, 4,	4, 3, 4, 7, 8, 7, 8, 4,
0, 9, 9, 9, 5, 0, 7, 9, 2, 2, 6, 3, 4, 6, 1, 6, 9, 6, 6, 2, 0, 8, 0, 7, 0, 7, 8, 7, 0, 2, 8, 6,	snip 1, 9, 1, 5, 1,	snip 1, 9, 1, 5, 1,
0, 4, 8, 6, 7, 8, 0, 2, 5, 0, 2, 5, 4, 4, 8, 2,	5, 0, 2, 9, 5, 1, 7, 0, 2, 5, 3, 7, 9, 9, 6, 9, 5, 9,	5, 0, 2, 9, 5, 1, 7, 0, 2, 5, 3, 7, 9, 9, 6, 9, 5, 9,
7, 9, 8, 1, 2, 4, 5, 4, 5, 6, 7, 6, 2, 0, 2, 5,	3, 7, 3, 0, 4, 5, 7, 7, 0,	3, 7, 3, 0, 4, 5, 7, 7, 0,
9, 5, 0, 5, 4, 3, 6, 2, 5, 0, 4, 5, 9, 7, 4, 4,	9, 4, 2, 2, 3, 5, 3, 5, 7,	9, 4, 2, 2, 3, 5, 3, 5, 7,
5, 0, 3, 7, 5, 4, 5, 0, 0, 5, 2, 0, 8, 0, 3, 5,	1, 0, 1, 1, 2, 6, 9, 5, 2,	1, 0, 1, 1, 2, 6, 9, 5, 2,
2, 9, 8, 5, 6, 3, 0, 3, 5, 6, 2, 2, 8, 1, 4, 9,	0, 6, 3, 5, 4, 3, 0, 6, 1,	0, 6, 3, 5, 4, 3, 0, 6, 1,
8, 8, 7, 7, 1, 4, 8, 2, 1, 3, 9, 8, 8, 0, 5, 0,	4, 8, 7, 5, 3, 6, 1, 0, 4,	4, 8, 7, 5, 3, 6, 1, 0, 4,
5, 2, 4, 0, 4, 6, 0, 8, 5, 7, 2, 9, 6, 4, 2, 0,	8, 7, 5, 1, 4, 6, 1, 0, 0,	8, 7, 5, 1, 4, 6, 1, 0, 0,
0, 7, 7, 1, 2, 4, 4, 3, 6, 2, 0, 2, 9, 8, 0, 8,	2, 1, 9, 2, 3, 3, 5, 6, 8, 0, 3, 1, 1, 0, 6, 8, 9, 4,	2, 1, 9, 2, 3, 3, 5, 6, 8,
0, 2, 2, 5, 3, 2, 2, 8, 5, 7, 5, 5, 7, 4, 2, 4, 2, 9, 4, 1, 4, 1, 8, 8, 4, 1, 0, 3, 4, 0, 5, 8,	8, 0, 5, 1, 0, 4, 0, 5, 6,	0, 3, 1, 1, 0, 6, 8, 9, 4, 8, 0, 5, 1, 0, 4, 0, 5, 6,
8, 4, 4, 2, 7, 0, 3, 1, 3, 3, 1, 4, 4, 1, 7, 4,	3, 6, 6, 1, 3, 5, 0, 0, 7,	3, 6, 6, 1, 3, 5, 0, 0, 7,
9, 3, 2, 3, 7, 0, 8, 1, 9, 7, 2, 1, 9, 3, 7, 6,	9, 1, 7, 9, 1, 7, 3, 3, 4,	9, 1, 7, 9, 1, 7, 3, 3, 4,
0, 5, 1, 4};	0, 2, 5, 0, 8, 7, 3, 9, 4,	0, 2, 5, 0, 8, 7, 3, 9, 4,
int k = 5555;	9, 7, 7, 9, 0, 2, 1, 6, 8,	9, 7, 7, 9, 0, 2, 1, 6, 8,
LLNode* head = LLNode::createWithIterators(arr,	2, 0, 7, 9, 9, 4, 2, 2, 8,	2, 0, 7, 9, 9, 4, 2, 2, 8,
<pre>arr + sizeof(arr) / sizeof(int));</pre>	8, 1, 7, 9, 7, 8, 7, 7, 6,	8, 1, 7, 9, 7, 8, 7, 7, 6,
<pre>LLNode::printList(head); cout << "\n";</pre>	7, 2, 9, 4, 6, 2, 5, 1, 7, 3, 3, 1, 7, 5, 4, 9, 9, 4,	7, 2, 9, 4, 6, 2, 5, 1, 7, 3, 3, 1, 7, 5, 4, 9, 9, 4,
LLNode* newhead = rotateLinkedList(head, k);	0, 4, 7, 4, 3, 5, 2, 9, 7,	0, 4, 7, 4, 3, 5, 2, 9, 7,
LLNode::printList(newhead);	5, 6, 9, 2, 0, 1, 9, 7, 2,	5, 6, 9, 2, 0, 1, 9, 7, 2,
	5, 0, 6, 2, 6, 4, 1, 5, 1,	5, 0, 6, 2, 6, 4, 1, 5, 1,
	7, 9, 0, 5, 2, 4, 1, 3, 9,	7, 9, 0, 5, 2, 4, 1, 3, 9,
	7, 2, 4, 0, 9, 2, 6, 6, 2,	7, 2, 4, 0, 9, 2, 6, 6, 2,
	9, 1, 1, 3, 4, 4, 9, 0, 5,	9, 1, 1, 3, 4, 4, 9, 0, 5,
	1, 7, 7, 4, 5, 0, 5, 4, 7,	1, 7, 7, 4, 5, 0, 5, 4, 7,
	1, 9, 1, 0, 5, 6, 3, 4, 2, 0, 1, 6, 6, 5, 4, 0, 0, 7,	1, 9, 1, 0, 5, 6, 3, 4, 2, 0, 1, 6, 6, 5, 4, 0, 0, 7,
	8, 3, 4, 3, 7, 1, 3, 1, 9,	8, 3, 4, 3, 7, 1, 3, 1, 9,
	0, 4, 3, 5, 0, 9, 7, 9, 3,	0, 4, 3, 5, 0, 9, 7, 9, 3,
	0, 2, 9, 3, 0, 8, 0, 0, 5,	0, 2, 9, 3, 0, 8, 0, 0, 5,
	2, 8, 5, 8, 0, 6, 3, 8, 7,	2, 8, 5, 8, 0, 6, 3, 8, 7,
	3, 6, 2, 3, 7, 8, 5, 5, 4,	3, 6, 2, 3, 7, 8, 5, 5, 4,
	9, 5, 5, 3, 7, 7, 0, 0, 0,	9, 5, 5, 3, 7, 7, 0, 0, 0, 0, 5, 4, 6, 1, 2, 3, 2, 2,
	0, 5, 4, 6, 1, 2, 3, 2, 2, 9, 1, 1, 5, 9, 8, 8, 9, 9,	9, 1, 1, 5, 9, 8, 8, 9, 9,
	4, 4, 1, 8, 2, 9, 9, 0, 8,	4, 4, 1, 8, 2, 9, 9, 0, 8,
	0, 2, 2, 3, 9, 3, 3, 0, 1,	0, 2, 2, 3, 9, 3, 3, 0, 1,
	4, 7, 6, 6, 0, 6, 4, 1, 2,	4, 7, 6, 6, 0, 6, 4, 1, 2,
	8, 7, 9, 2, 7, 0, 7, 9, 8,	8, 7, 9, 2, 7, 0, 7, 9, 8,
	0, 8, 7, 4, 4, 2, 3, 5, 0,	0, 8, 7, 4, 4, 2, 3, 5, 0,
	2, 7, 9, 5, 8, 5, 9, 9, 1, 1, 7, 7, 6, 3, 6, 3, 1, 3,	2, 7, 9, 5, 8, 5, 9, 9, 1,
	9, 8, 5, 6, 1, 3, 6, 1, 1,	1, 7, 7, 6, 3, 6, 3, 1, 3, 9, 8, 5, 6, 1, 3, 6, 1, 1,
	7, 0, 4, 5, 7, 6, 2, 8, 8,	7, 0, 4, 5, 7, 6, 2, 8, 8,
	2, 7, 7, 1, 4, 4, 3, 7, 9,	2, 7, 7, 1, 4, 4, 3, 7, 9,
	0, 1, 6, 0, 3, 1, 2, 6, 8,	0, 1, 6, 0, 3, 1, 2, 6, 8,
	2, 2, 1, 1, 0, 6, 9, 1, 4,	2, 2, 1, 1, 0, 6, 9, 1, 4,
	7, 4, 3, 4, 6, 1, 6, 5, 8,	7, 4, 3, 4, 6, 1, 6, 5, 8,
	4, 1, 2, 8, 5, 7, 6, 7, 8,	4, 1, 2, 8, 5, 7, 6, 7, 8,
	5, 5, 7, 5, 4, 1, 4, 1, 8, 5, 8, 0, 2, 1, 1, 7, 2, 3,	5, 5, 7, 5, 4, 1, 4, 1, 8, 5, 8, 0, 2, 1, 1, 7, 2, 3,
	4, 6, 3, 3, 5, 5, 5, 4, 1,	4, 6, 3, 3, 5, 5, 5, 4, 1,
	2, 3, 1, 6, 5, 5, 9, 6, 9,	2, 3, 1, 6, 5, 5, 9, 6, 9,
	0, 1, 5, 6, 8, 8, 5, 5, 9,	0, 1, 5, 6, 8, 8, 5, 5, 9,
	0, 1, 8, 4, 5, 8, 6, 4, 5,	0, 1, 8, 4, 5, 8, 6, 4, 5,
	1, 4, 0, 1, 0, 2, 2, 6, 7,	1, 4, 0, 1, 0, 2, 2, 6, 7,
	9, 0, 7, 0, 5, 0, 4, 0, 1,	9, 0, 7, 0, 5, 0, 4, 0, 1,
	4, 0, 1, 0, 9, 9, 9, 1, 9, 7, 1, 5, 9, 2, 9, 9, 7, 0,	4, 0, 1, 0, 9, 9, 9, 1, 9, 7, 1, 5, 9, 2, 9, 9, 7, 0,
	6, 0, 5, 5, 9, 7, 6, 4, 0,	6, 0, 5, 5, 9, 7, 6, 4, 0,
	4, 4, 4, 1, 5, 6, 9, 3, 1,	4, 4, 4, 1, 5, 6, 9, 3, 1,
	8, 3, 0, 0, 4, 5, 6, 3, 6,	8, 3, 0, 0, 4, 5, 6, 3, 6,
	9, 2, 1, 0, 4, 6, 3, 6, 5,	9, 2, 1, 0, 4, 6, 3, 6, 5,
I I	I	ı I I

11:14 P	M Singly	Linked List: Xem lại lân làm thứ	BK-LMS
	Test	Expected	Got
		9, 0, 5, 5, 8, 4, 0, 2, 4,	9, 0, 5, 5, 8, 4, 0, 2, 4,
		3, 5, 2, 9, 3, 9, 9, 6, 4,	3, 5, 2, 9, 3, 9, 9, 6, 4,
		1, 1, 2, 9, 1, 8, 4, 3, 9,	1, 1, 2, 9, 1, 8, 4, 3, 9,
		7, 6, 9, 4, 3, 5, 3, 7, 0,	7, 6, 9, 4, 3, 5, 3, 7, 0,
		7, 7, 9, 4, 8, 7, 5, 7, 2,	7, 7, 9, 4, 8, 7, 5, 7, 2,
		6, 1, 6, 6, 2, 2, 2, 6, 4, 5, 1, 4, 5, 6, 5, 7, 5, 5,	6, 1, 6, 6, 2, 2, 2, 6, 4, 5, 1, 4, 5, 6, 5, 7, 5, 5,
		9, 7, 8, 6, 1, 1, 8, 1, 2,	9, 7, 8, 6, 1, 1, 8, 1, 2,
		8, 9, 4, 8, 3, 0, 6, 9, 1,	8, 9, 4, 8, 3, 0, 6, 9, 1,
		6, 7, 7, 1, 6, 6, 6, 7, 4,	6, 7, 7, 1, 6, 6, 6, 7, 4,
		3, 2, 9, 2, 5, 5, 8, 9, 4,	3, 2, 9, 2, 5, 5, 8, 9, 4,
		7, 5, 0, 1, 9, 2, 0, 0, 8,	7, 5, 0, 1, 9, 2, 0, 0, 8,
		9, 0, 8, 7, 8, 3, 6, 6, 2,	9, 0, 8, 7, 8, 3, 6, 6, 2,
		6, 5, 2, 0, 5, 6, 1, 9, 2,	6, 5, 2, 0, 5, 6, 1, 9, 2,
		1, 7, 2, 7, 1, 6, 5, 4, 3,	1, 7, 2, 7, 1, 6, 5, 4, 3,
		1, 0, 3, 4, 1, 1, 3, 4, 9, 8, 1, 6, 9, 4, 7, 1, 8, 4,	1, 0, 3, 4, 1, 1, 3, 4, 9,
		4, 9, 4, 3, 4, 0, 6, 0, 5,	8, 1, 6, 9, 4, 7, 1, 8, 4, 4, 9, 4, 3, 4, 0, 6, 0, 5,
		9, 4, 4, 2, 8, 4, 3, 5, 8,	9, 4, 4, 2, 8, 4, 3, 5, 8,
		7, 4, 1, 7, 4, 6, 3, 1, 5,	7, 4, 1, 7, 4, 6, 3, 1, 5,
		6, 4, 2, 6, 4, 6, 1, 1, 2,	6, 4, 2, 6, 4, 6, 1, 1, 2,
		3, 4, 5, 6, 5, 3, 8, 1, 8,	3, 4, 5, 6, 5, 3, 8, 1, 8,
		8, 9, 5, 4, 3, 3, 5, 4, 3,	8, 9, 5, 4, 3, 3, 5, 4, 3,
		7, 7, 0, 2, 8, 2, 5, 0, 4,	7, 7, 0, 2, 8, 2, 5, 0, 4,
		1, 6, 0, 9, 5, 5, 6, 3, 8,	1, 6, 0, 9, 5, 5, 6, 3, 8,
		4, 9, 8, 8, 0, 9, 6, 3, 8,	4, 9, 8, 8, 0, 9, 6, 3, 8,
		8, 2, 4, 1, 5, 2, 1, 2, 3,	8, 2, 4, 1, 5, 2, 1, 2, 3,
		4, 1, 2, 9, 4, 8, 6, 6, 9,	4, 1, 2, 9, 4, 8, 6, 6, 9,
		9, 0, 8, 5, 8, 5, 0, 2, 4,	9, 0, 8, 5, 8, 5, 0, 2, 4,
		8, 8, 6, 4, 9, 5, 5, 8, 9,	8, 8, 6, 4, 9, 5, 5, 8, 9,
		1, 5, 7, 8, 5, 5, 4, 0, 3, 3, 2, 2, 3, 5, 1, 1, 6, 4,	1, 5, 7, 8, 5, 5, 4, 0, 3, 3, 2, 2, 3, 5, 1, 1, 6, 4,
		4, 9, 3, 7, 3, 6, 0, 9, 3,	4, 9, 3, 7, 3, 6, 0, 9, 3,
		3, 4, 4, 7, 9, 9, 8, 0, 1,	3, 4, 4, 7, 9, 9, 8, 0, 1,
		2, 4, 6, 6, 1, 9, 7, 5, 3,	2, 4, 6, 6, 1, 9, 7, 5, 3,
		1, 6, 3, 6, 3, 3, 8, 1, 3,	1, 6, 3, 6, 3, 3, 8, 1, 3,
		4, 7, 9, 7, 3, 4, 3, 7, 1,	4, 7, 9, 7, 3, 4, 3, 7, 1,
		4, 9, 8, 3, 6, 2, 2, 8, 9,	4, 9, 8, 3, 6, 2, 2, 8, 9,
		5, 6, 6, 6, 2, 2, 9, 5, 8,	5, 6, 6, 6, 2, 2, 9, 5, 8,
		3, 2, 0, 9, 1, 9, 4, 4, 1,	3, 2, 0, 9, 1, 9, 4, 4, 1,
		7, 6, 4, 0, 1, 4, 3, 8, 7, 1, 4, 1, 4, 1, 0, 1, 0, 4,	7, 6, 4, 0, 1, 4, 3, 8, 7, 1, 4, 1, 4, 1, 0, 1, 0, 4,
		6, 0, 8, 6, 0, 5, 8, 8, 9,	6, 0, 8, 6, 0, 5, 8, 8, 9,
		9, 7, 6, 7, 5, 8, 3, 2, 3,	9, 7, 6, 7, 5, 8, 3, 2, 3,
		2, 7, 3, 8, 3, 6, 2, 3, 3,	2, 7, 3, 8, 3, 6, 2, 3, 3,
		1, 4, 3, 4, 1, 5, 5, 8, 0,	1, 4, 3, 4, 1, 5, 5, 8, 0,
		2, 1, 5, 7, 0, 7, 1, 9, 2,	2, 1, 5, 7, 0, 7, 1, 9, 2,
		6, 6, 7, 6, 9, 0, 6, 3, 0,	6, 6, 7, 6, 9, 0, 6, 3, 0,
		0, 8, 1, 2, 5, 4, 2, 6, 5,	0, 8, 1, 2, 5, 4, 2, 6, 5,
		3, 8, 5, 8, 3, 0, 9, 8, 0,	3, 8, 5, 8, 3, 0, 9, 8, 0,
		1, 4, 4, 7, 9, 4, 2, 9, 6,	1, 4, 4, 7, 9, 4, 2, 9, 6,
		2, 3, 4, 4, 4, 5, 0, 1, 7, 9, 2, 6, 0, 4, 2, 5, 1, 3,	2, 3, 4, 4, 4, 5, 0, 1, 7, 9, 2, 6, 0, 4, 2, 5, 1, 3,
		6, 9, 6, 8, 9, 0, 2, 5, 5,	6, 9, 6, 8, 9, 0, 2, 5, 5,
		8, 3, 2, 4, 9, 2, 4, 6, 8,	8, 3, 2, 4, 9, 2, 4, 6, 8,
		1, 9, 4, 9, 5, 5, 7, 4, 3,	1, 9, 4, 9, 5, 5, 7, 4, 3,
		2, 4, 1, 8, 0, 2, 3, 8, 0,	2, 4, 1, 8, 0, 2, 3, 8, 0,
		1, 6, 3, 6, 2, 5, 6, 0, 3,	1, 6, 3, 6, 2, 5, 6, 0, 3,
		1, 7, 7, 4, 6, 5, 6, 3, 7,	1, 7, 7, 4, 6, 5, 6, 3, 7,
		1, 4, 0, 9, 3, 2, 7, 3, 1,	1, 4, 0, 9, 3, 2, 7, 3, 1,
		2, 3, 7, 9, 5, 4, 1, 6, 6,	2, 3, 7, 9, 5, 4, 1, 6, 6,
		5, 6, 7, 7, 2, 4, 6, 9, 8,	5, 6, 7, 7, 2, 4, 6, 9, 8,
		1, 6, 3, 8, 5, 2, 9, 8, 5, 8, 5, 7, 1, 5, 0, 0, 8, 2,	1, 6, 3, 8, 5, 2, 9, 8, 5, 8, 5, 7, 1, 5, 0, 0, 8, 2,
		1, 9, 7, 2, 9, 3, 7, 6, 2,	1, 9, 7, 2, 9, 3, 7, 6, 2,
		5, 2, 7, 3, 4, 3, 7, 5, 3,	5, 2, 7, 3, 4, 3, 7, 5, 3,
		9, 9, 9, 3, 7, 6, 5, 6, 9,	9, 9, 9, 3, 7, 6, 5, 6, 9,
		9, 2, 0, 8, 1, 9, 1, 8, 8,	9, 2, 0, 8, 1, 9, 1, 8, 8,
		8, 6, 9, 2, 3, 3, 5, 2, 8,	8, 6, 9, 2, 3, 3, 5, 2, 8,
		0, 0, 3, 5, 5, 1, 3, 3, 2,	0, 0, 3, 5, 5, 1, 3, 3, 2,
		1, 7, 7, 2, 2, 0, 5, 9, 5,	1, 7, 7, 2, 2, 0, 5, 9, 5,
1.			I

Test	Expected	Got
	6, 7, 8, 5, 9, 5, 8, 6, 7,	6, 7, 8, 5, 9, 5, 8, 6, 7,
	0, 9, 9, 6, 3, 8, 1, 4, 8,	0, 9, 9, 6, 3, 8, 1, 4, 8,
	7, 2, 1, 1, 2, 0, 3, 6, 7,	7, 2, 1, 1, 2, 0, 3, 6, 7,
	3, 5, 9, 2, 2, 2, 2, 7, 8,	3, 5, 9, 2, 2, 2, 2, 7, 8,
	2, 5, 8, 8, 7, 0, 0, 3, 4,	2, 5, 8, 8, 7, 0, 0, 3, 4,
	1, 5, 9, 6, 3, 7, 6, 6, 8,	1, 5, 9, 6, 3, 7, 6, 6, 8,
	1, 8, 0, 3, 1, 2, 9, 6, 0,	1, 8, 0, 3, 1, 2, 9, 6, 0,
	2, 2, 2, 4, 0, 0, 5, 1, 1,	2, 2, 2, 4, 0, 0, 5, 1, 1,
	3, 3, 8, 3, 4, 7, 6, 0, 3,	3, 3, 8, 3, 4, 7, 6, 0, 3,
	3, 4, 8, 4, 0, 8, 1, 1, 3,	3, 4, 8, 4, 0, 8, 1, 1, 3,
	4, 8, 4, 3, 1, 5, 2, 2, 4,	4, 8, 4, 3, 1, 5, 2, 2, 4,
	0, 2, 9, 5, 7, 7, 2, 1, 0,	0, 2, 9, 5, 7, 7, 2, 1, 0,
	6, 9, 6]	6, 9, 6]

Passed all tests! 🗸



Dúng

Marks for this submission: 1,00/1,00.

```
Câu hỏi 7
Đúng
Đạt điểm 1,00 trên 1,00
```

Class **LinkedList** is used to represent single linked list, described as the following:

```
class LinkedList {
  public:
     class Node;
  private:
     Node* head;
     Node* tail;
     int size;
  public:
     class Node {
       private:
         int value:
         Node* next;
         friend class LinkedList;
       public:
         Node() {
            this->next = NULL;
         }
         Node(Node* node) {
            this->value = node->value;
            this->next = node->next;
         Node(int value, Node* next = NULL) {
            this->value = value;
            this->next = next;
     };
     LinkedList(): head(NULL), tail(NULL), size(0) {};
     void partition(int k);
};
```

In this class; head, tail and size are the pointers of the first element, the last element and size of linked list.

Request: Implement function

void LinkedList::partition(int k);

To rearrange elements in this linked list by this way: split all elements of this linked list to 3 groups include: group I (the value of each element is smaller than k), group II (the value of each element is equal to k) and group III (the value of each element is larger than k); after that, move group I to the head of linked list, group II is after group I and group III is after group II. Note that the orders of the elements of each group are unchanged.

Example:

```
- The given linked list: 10->55->45->42->50
```

- k=45

In this case, group I includes elements with value 10 and 42, group II includes elements with 45 and group III includes elements with value 55 and 50. Rearrange by above way, this linked list will become 10->42->45->55->50 (the orders of the elements in each group is unchanged: 10 before 42 and 55 before 50).

Note: In this exercise, libraries iostream, sstream and using namespace std; have been used. You can add other functions for your answer, but you are not allowed to add other libraries.

For example:

Test	Result
LinkedList* 11 = new LinkedList(); 11->add(20); 11->add(30); 11->add(10); 11->add(60); 11->add(40); 11->add(45); 11->add(55); 11->partition(45); cout << 11->toString() << "\n";	[20,30,10,40,45,60,55]

Answer: (penalty regime: 0 %)

Reset answer

```
1 void LinkedList::partition(int k) {
        if (!head || !head->next) return; // No need to partition if the list is empty or has one element.
2
 3
        Node *lessHead = nullptr, *lessTail = nullptr; // Group I (< k)
4
 5
        Node *equalHead = nullptr, *equalTail = nullptr; // Group II (= k)
        Node *greaterHead = nullptr, *greaterTail = nullptr; // Group III (> k)
 6
 7
        Node* current = head;
8
9
        // Step 1: Divide the list into three separate lists
10
11
        while (current) {
            Node* nextNode = current->next; // Store next node before modifications
12
13
            current->next = nullptr; // Isolate the node
14
15
            if (current->value < k) {</pre>
                if (!lessHead) lessHead = lessTail = current;
16
17
                else {
18
                    lessTail->next = current;
19
                    lessTail = current;
20
21 ,
            } else if (current->value == k) {
                if (!equalHead) equalHead = equalTail = current;
22
23
                else {
24
                    equalTail->next = current;
25
                    equalTail = current;
26
                }
27
            } else {
28
                if (!greaterHead) greaterHead = greaterTail = current;
29
30
                    greaterTail->next = current;
31
                    greaterTail = current;
32
                }
33
            }
34
35
            current = nextNode;
36
        }
37
38
        // Step 2: Connect the three lists together
        if (lessTail) lessTail->next = equalHead ? equalHead : greaterHead;
39
        if (equalTail) equalTail->next = greaterHead;
40
41
42
        // Step 3: Update head and tail
        head = lessHead ? lessHead : (equalHead ? equalHead : greaterHead);
43
44
        tail = greaterTail ? greaterTail : (equalTail ? equalTail : lessTail);
45
46
```

	Test	Expected	Got	
~	LinkedList* 11 = new LinkedList(); 11->add(20); 11->add(30); 11->add(10); 11->add(60); 11->add(40); 11->add(45); 11->add(55); 11->partition(45); cout << 11->toString() << "\n";	[20,30,10,40,45,60,55]	[20,30,10,40,45,60,55]	~

Passed all tests! 🗸



Marks for this submission: 1,00/1,00.

```
Câu hải 8
Sai
Đạt điểm 0,00 trên 1,00
```

Polynomials is an important application of arrays and linked lists. A polynomial is composed of different terms where each of them holds a coefficient and an exponent. A polynomial p(x) is the expression in variable x which is in the form $(a_nx^n + a_{n-1}x^{n-1} + + a_1x + a_0)$, where a_n , a_{n-1} ,, a_0 fall in the category of real numbers and 'n' is the non-negative integer, which is called the degree of polynomial.

Example: $10x^2 + 26x$, here 10 and 26 are coefficients and 2, 1 is its exponential value.

Points to keep in Mind while working with Polynomials:

- The sign of each coefficient and exponent is stored within the coefficient and the exponent itself.
- The storage allocation for each term in the polynomial must be done in descending order of their exponent.

In this question, complete SLinkedList class is included (Check the <u>IList</u> documentation under Lab 1 for details on the class and its methods). You should use this class to complete your Polynomial class with initialized frame as following. This task is implement insertTerm to insert a term into a polynomial.

```
class Polynomial;
class Term {
private:
   double coeff;
    int exp;
   friend class Polynomial;
public:
    Term(double coeff = 0.0, int exp = 0) {
       this->coeff = coeff;
        this->exp = exp;
   bool operator==(const Term& rhs) const {
        return this->coeff == rhs.coeff && this->exp == rhs.exp;
   }
   friend ostream & operator<<(ostream &os, const Term& term) {</pre>
        cout << endl;
        cout << "Term: " << "(" << term.coeff << " " << term.exp << ")";</pre>
        return os:
   }
};
class Polynomial {
private:
   SLinkedList<Term>* terms;
public:
   Polynomial() {
        this->terms = new SLinkedList<Term>();
   ~Polynomial() {
        this->terms->clear():
   void insertTerm(const Term& term);
   void insertTerm(double coeff, int exp);
   void print() {
       SLinkedList<Term>::Iterator it;
        cout << "[";
        for (it = this->terms->begin(); it != this->terms->end(); it++) {
            cout << (*it);
        cout << endl << "]";
   }
};
```

For example:

Test	Result
<pre>Polynomial *poly = new Polynomial();</pre>	[
<pre>poly->insertTerm(6.0, 2);</pre>	Term: (10 5)
<pre>poly->insertTerm(4.0, 5);</pre>	Term: (4 3)
<pre>poly->insertTerm(4.0, 3);</pre>	Term: (6 2)
<pre>poly->insertTerm(6.0, 5);</pre>	Term: (-1 0)
<pre>poly->insertTerm(-1.0, 0);</pre>]
poly->insertTerm(-6.0, 6);	
<pre>poly->insertTerm(6.0, 6);</pre>	
poly->print();	
int n = 5;	[
int coeff[] = { 1, 2, 3, 4, 5 };	Term: (5 5)
int exp[] = { 1, 2, 3, 4, 5 };	Term: (4 4)
	Term: (3 3)
Polynomial p1;	Term: (2 2)
for (int i = 0; i < n; ++i)	Term: (1 1)
<pre>p1.insertTerm(coeff[i], exp[i]);</pre>]
p1.print();	

Answer: (penalty regime: 0, 0, 0, 5, 10 %)

Reset answer

```
1 void Polynomial::insertTerm(const Term& term) {
        if (term.coeff == 0) return;
2
 3
4
        SLinkedList<Term>::Iterator it = terms->begin();
5
        SLinkedList<Term>::Iterator prev;
6
        while (it != terms->end() && (*it).exp > term.exp) {
7
            prev = it;
8
9
            ++it;
10
        }
11
        if (it != terms->end() && (*it).exp == term.exp) {
12 🔻
            (*it).coeff += term.coeff;
13
14
            if ((*it).coeff == 0) terms->remove(it);
15
        } else {
16
            if (it == terms->begin()) {
17
                terms->addFront(term);
18
            } else {
19
                terms->insertAfter(prev, term);
20
21
        }
22
23
24 void Polynomial::insertTerm(double coeff, int exp) {
25
        insertTerm(Term(coeff, exp));
26
```

3/30/25,	11:14 PM	Singly Linked List: Xem lại lần làm thử BK-LMS

Syntax Error(s)

```
__tester__.cpp: In member function 'void Polynomial::insertTerm(const Term&)':
__tester__.cpp:71:38: error: 'class SLinkedList<Term>' has no member named 'remove'; did you mean 'removeAt'?
                     if ((*it).coeff == 0) terms->remove(it);
        removeAt
  _tester__.cpp:73:16: error: no match for 'operator==' (operand types are 'SLinkedList<Term>::Iterator' and
'SLinkedList<Term>::Iterator')
    73 l
                       if (it == terms->begin()) {
                              ~~ ^~ ~~~~~~~~~~~
        Iterator<[...]>
        - 1
In file included from /usr/include/c++/9/bits/stl_algobase.h:64,
                          from /usr/include/c++/9/bits/char_traits.h:39,
                          from /usr/include/c++/9/string:40,
                          from Tlist h.3
                          from SLinkedList.h:4,
                          from __tester__.cpp:1:
/usr/include/c++/9/bits/stl_pair.h:448:5: note: candidate: 'template<class _T1, class _T2> constexpr bool std::operator==
(const std::pair<_T1, _T2>&, const std::pair<_T1, _T2>&)'
  448 | operator==(const pair<_T1, _T2>& __x, const pair<_T1, _T2>& __y)
/usr/include/c++/9/bits/stl_pair.h:448:5: note: template argument deduction/substitution failed:
_tester_.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::pair<_T1, _T2>'
                     if (it == terms->begin()) {
       In file included from /usr/include/c++/9/bits/stl_algobase.h:67,
                         from /usr/include/c++/9/bits/char_traits.h:39,
                          from /usr/include/c++/9/string:40,
                          from IList.h:3,
                          from SLinkedList.h:4.
                          from __tester__.cpp:1:
/usr/include/c++/9/bits/stl_iterator.h:325:5: note: candidate: 'template<class _Iterator> bool std::operator==(const
std::reverse_iterator<_Iterator>&, const std::reverse_iterator<_Iterator>&)'
                 operator==(const reverse_iterator<_Iterator>& __x,
                  ^~~~~
/usr/include/c++/9/bits/stl_iterator.h:325:5: note: template argument deduction/substitution failed:
 _tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::reverse_iterator<_Iterator>'
    73 l
                      if (it == terms->begin()) {
In file included from /usr/include/c++/9/bits/stl_algobase.h:67,
                          from /usr/include/c++/9/bits/char_traits.h:39,
                          from /usr/include/c++/9/string:40,
                          from IList.h:3.
                          from SLinkedList.h:4,
                          from __tester__.cpp:1:
/usr/include/c++/9/bits/stl_iterator.h:363:5: note: candidate: 'template<class _IteratorL, class _IteratorR> bool
\verb|std::operator==(const std::reverse_iterator<\_Iterator>| a, const std::reverse_iterator<\_IteratorR>| a, const std::reverse\_iterator<\_IteratorR>| a, const std::reverse\_iterator<| a, const std::rev
             operator==(const reverse_iterator<_IteratorL>& __x,
  363 l
        /usr/include/c++/9/bits/stl_iterator.h:363:5: note: template argument deduction/substitution failed:
__tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::reverse_iterator<_Iterator>'
                   if (it == terms->begin()) {
    73 l
       In file included from /usr/include/c++/9/bits/stl_algobase.h:67,
                          from /usr/include/c++/9/bits/char_traits.h:39,
                          from /usr/include/c++/9/string:40,
                          from IList.h:3.
                          from SLinkedList.h:4.
                          from tester .cpp:1:
/usr/include/c++/9/bits/stl_iterator.h:1136:5: note: candidate: 'template<class _IteratorL, class _IteratorR> bool
std::operator==(const std::move_iterator<_IteratorL>&, const std::move_iterator<_IteratorR>&)'
 1136 | operator==(const move_iterator<_IteratorL>& __x,
/usr/include/c++/9/bits/stl_iterator.h:1136:5: note: template argument deduction/substitution failed:
__tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::move_iterator<_IteratorL>'
                       if (it == terms->begin()) {
        In file included from /usr/include/c++/9/bits/stl_algobase.h:67,
                          from /usr/include/c++/9/bits/char traits.h:39,
                          from /usr/include/c++/9/string:40,
                          from IList.h:3,
                          from SLinkedList.h:4,
                          from __tester__.cpp:1:
```

```
/usr/include/c++/9/bits/stl_iterator.h:1142:5: note: candidate: 'template<class _Iterator> bool std::operator==(const
std::move_iterator<_IteratorL>&, const std::move_iterator<_IteratorL>&)'
         operator==(const move_iterator<_Iterator>& __x,
/usr/include/c++/9/bits/stl_iterator.h:1142:5: note: template argument deduction/substitution failed:
_tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::move_iterator<_IteratorL>'
             if (it == terms->begin()) {
In file included from /usr/include/c++/9/bits/char_traits.h:40,
                from /usr/include/c++/9/string:40,
                from IList.h:3,
                from SLinkedList.h:4,
                from __tester__.cpp:1:
/usr/include/c++/9/bits/postypes.h:222:5: note: candidate: 'template<class _StateT> bool std::operator==(const
std::fpos<_StateT>&, const std::fpos<_StateT>&)'
         operator==(const fpos< StateT>& lhs, const fpos< StateT>& rhs)
/usr/include/c++/9/bits/postypes.h:222:5: note: template argument deduction/substitution failed:
__tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::fpos<_StateT>'
              if (it == terms->begin()) {
In file included from /usr/include/c++/9/string:41,
               from IList.h:3,
                from SLinkedList.h:4,
                from __tester__.cpp:1:
/usr/include/c++/9/bits/allocator.h:167:5: note: candidate: 'template<class _T1, class _T2> bool std::operator==(const
std::allocator< CharT>&, const std::allocator< T2>&)'
        operator==(const allocator<_T1>&, const allocator<_T2>&)
/usr/include/c++/9/bits/allocator.h:167:5: note: template argument deduction/substitution failed:
__tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::allocator<_CharT>'
            if (it == terms->begin()) {
  73
In file included from /usr/include/c++/9/string:55,
                from IList.h:3.
                from SLinkedList.h:4,
                from tester .cpp:1:
/usr/include/c++/9/bits/basic_string.h:6144:5: note: candidate: 'template<class _CharT, class _Traits, class _Alloc> bool
std::operator==(const std::_cxx11::basic_string<_CharT, _Traits, _Alloc>&, const std::__cxx11::basic_string<_CharT,
_Traits, _Alloc>&)'
         operator==(const basic_string<_CharT, _Traits, _Alloc>& __lhs,
/usr/include/c++/9/bits/basic_string.h:6144:5: note: template argument deduction/substitution failed:
 _tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::__cxx11::basic_string<_CharT,
_Traits, _Alloc>'
  73
             if (it == terms->begin()) {
    In file included from /usr/include/c++/9/string:55,
                from IList.h:3,
                from SLinkedList.h:4.
                from __tester__.cpp:1:
/usr/include/c++/9/bits/basic_string.h:6152:5: note: candidate: 'template<class _CharT> typename
__gnu_cxx::__enable_if<std::__is_char<_Tp>::__value, bool>::__type std::operator==(const
std::__cxx11::basic_string<_CharT>&, const std::__cxx11::basic_string<_CharT>&)'
          operator==(const basic_string<_CharT>& __lhs,
/usr/include/c++/9/bits/basic_string.h:6152:5: note: template argument deduction/substitution failed:
_tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const
std:: cxx11::basic string< CharT>'
  73 l
              if (it == terms->begin()) {
In file included from /usr/include/c++/9/string:55,
                from IList.h:3.
                from SLinkedList.h:4,
                from tester .cpp:1:
/usr/include/c++/9/bits/basic_string.h:6166:5: note: candidate: 'template<class _CharT, class _Traits, class _Alloc> bool
std::operator==(const _CharT*, const std::__cxx11::basic_string<_CharT, _Traits, _Alloc>&)'
         operator==(const _CharT* __lhs,
6166
/usr/include/c++/9/bits/basic_string.h:6166:5: note: template argument deduction/substitution failed:
if (it == terms->begin()) {
```

```
In file included from /usr/include/c++/9/string:55,
                from IList.h:3,
                from SLinkedList.h:4,
                from __tester__.cpp:1:
/usr/include/c++/9/bits/basic_string.h:6178:5: note: candidate: 'template<class _CharT, class _Traits, class _Alloc> bool
std::operator==(const std::__cxx11::basic_string<_CharT, _Traits, _Alloc>&, const _CharT*)'
         operator==(const basic_string<_CharT, _Traits, _Alloc>& __lhs,
/usr/include/c++/9/bits/basic_string.h:6178:5: note: template argument deduction/substitution failed:
__tester__.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::__cxx11::basic_string<_CharT,
_Traits, _Alloc>'
              if (it == terms->begin()) {
In file included from /usr/include/c++/9/bits/ios_base.h:46,
                from /usr/include/c++/9/ios:42,
                from /usr/include/c++/9/istream:38,
                from /usr/include/c++/9/sstream:38,
                from SLinkedList.h:6.
                from __tester__.cpp:1:
/usr/include/c++/9/system_error:292:3: note: candidate: 'bool std::operator==(const std::error_code&, const
std::error code&)'
  292 | operator==(const error_code& __lhs, const error_code& __rhs) noexcept
/usr/include/c++/9/system_error:292:32: note: no known conversion for argument 1 from 'SLinkedList<Term>::Iterator' to
'const std::error code&'
 292 | operator==(const error_code& __lhs, const error_code& __rhs) noexcept
     /usr/include/c++/9/system_error:297:3: note: candidate: 'bool std::operator==(const std::error_code&, const
std::error_condition&)'
 297 | operator==(const error_code& __lhs, const error_condition& __rhs) noexcept
     /usr/include/c++/9/system_error:297:32: note: no known conversion for argument 1 from 'SLinkedList<Term>::Iterator' to
'const std::error_code&'
  297 | operator==(const error_code& __lhs, const error_condition& __rhs) noexcept
/usr/include/c++/9/system_error:304:3: note: candidate: 'bool std::operator==(const std::error_condition&, const
std::error_code&)'
 304 | operator==(const error_condition& __lhs, const error_code& __rhs) noexcept
/usr/include/c++/9/system_error:304:37: note: no known conversion for argument 1 from 'SLinkedList<Term>::Iterator' to
'const std::error_condition&'
 304 | operator==(const error_condition& __lhs, const error_code& __rhs) noexcept
/usr/include/c++/9/system_error:311:3: note: candidate: 'bool std::operator==(const std::error_condition&, const
std::error_condition&)'
 311 | operator==(const error_condition& __lhs,
        ^~~~~~~
     /usr/include/c++/9/system error:311:37: note: no known conversion for argument 1 from 'SLinkedList<Term>::Iterator' to
'const std::error_condition&'
 311 | operator==(const error_condition& __lhs,
    In file included from /usr/include/c++/9/bits/locale_facets.h:48,
                from /usr/include/c++/9/bits/basic_ios.h:37,
                from /usr/include/c++/9/ios:44,
                from /usr/include/c++/9/istream:38,
                from /usr/include/c++/9/sstream:38,
                from SLinkedList.h:6.
                from __tester__.cpp:1:
/usr/include/c++/9/bits/streambuf iterator.h:208:5: note: candidate: 'template<class CharT, class Traits> bool
std::operator==(const std::istreambuf_iterator<_CharT, _Traits>&, const std::istreambuf_iterator<_CharT, _Traits>&)'
 208 | operator==(const istreambuf_iterator<_CharT, _Traits>& __a,
/usr/include/c++/9/bits/streambuf_iterator.h:208:5: note: template argument deduction/substitution failed:
_tester_.cpp:73:32: note: 'SLinkedList<Term>::Iterator' is not derived from 'const std::istreambuf_iterator< CharT,
Traits>'
  73
               if (it == terms->begin()) {
__tester__.cpp:74:20: error: 'class SLinkedList<Term>' has no member named 'addFront'
                 terms->addFront(term);
  74 l
     _tester__.cpp:76:20: error: 'class SLinkedList<Term>' has no member named 'insertAfter'
                  terms->insertAfter(prev, term);
```



Marks for this submission: 0,00/1,00.

