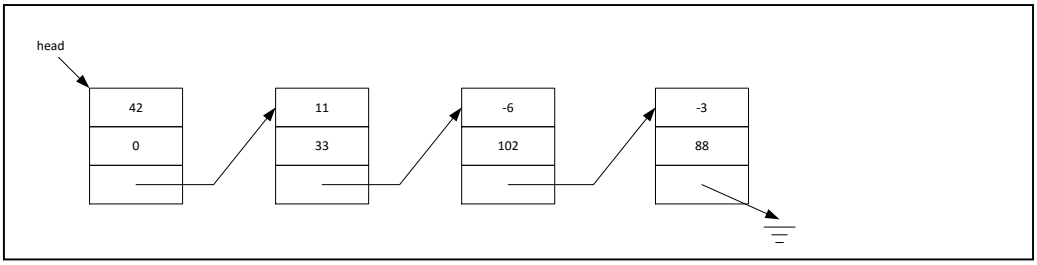
CSE 283 Homework #5 (40 points)

Due: 11:59pm, March 22 (Tuesday)

Part A

Develop a program for sparse vector operations. Notice that in a sparse vector, majority of elements will be zero, and it is usually implemented using the structure of a linked list. The following diagram shows a vector of 4 nonzero elements with value 42 at position 0, 11 at position 33, -6 at position 102, and -3 at position 88.



Your program needs to:

(1) Input sparse vectors
(2) Create sparse vectors according to inputs
(3) Allow adding elements of existing sparse vectors
(4) Print all elements of a vector
(5) Overloading operators for + and * (note that we use the symbol + for addition, and * for inner product).

A suggestion of class definition is given below.

```
class node {
public:
        int value;
        int position;
        node *next;
};

class myvector{
public:
        node *head;
        int length; //vector length
        int num_elements;//number of nonzero elements

        myvector operator+(myvector v);
        int operator*(myvector v);
        void input_vector();//
        void print_vector();//
        void add_ele(int i, int j); //i and j are for value and position of an element
        //You also need to design and implement constructor(s) for initializaiton
};
```

Part B: Re-do part A using list from Standard Template Library.

In you main program, you need to provide enough test cases for all vector operations.