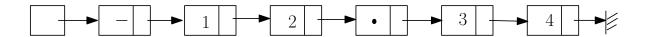| **CO 203: Data Structures Lab** | Autumn 2017 |

<div align="center">

Programming Assignment 2

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Arindam Karmakar

1   Big Number Representation

Only a finite range of numbers can be represented in computers because it uses a limited amount of bits to store a number. Neither arbitrarily big numbers (e.g. 34569999965439870945634) cannot be represented in a variable nor floating point numbers with very high precision (e.g. $-05.00000000000000000000000000000000000001$) can be stored in computer as a single variable. Moreover if we apply arithmetic operations on this numbers, it can generate overflow or underflow, producing a value too large or too small to be represented.

Solution??? Put the individual digits of a big number in the nodes of a linked list. For example, we store -12.34 can be stored in the following way:
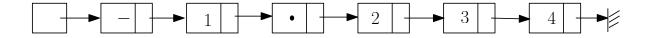

Our next assignment is about storing big numbers in singly linked lists and apply some arithmetic operations , like addition, subtraction, multiplication, division on these numbers. Following assignments are to completed within the next week.

a) Input to your program consists of a large number N. Store the number in single linked list. Print out the number. For example, the above number should be printed as

$$| - | \rightarrow |1| \rightarrow |2| \rightarrow | \bullet | \rightarrow |3| \rightarrow |4|$$

.

b) Write a function MULT(list,k) that computes the product $N \times 10^k$ where *list* is the linked list that represents the number N. The product should be represented in the created linked list only. **Your program should not create any other nodes**. You can only manipulate the pointers in your program. Your program should also report **overflow / underflow**. If $k = -1$, the list should look like:

   If $k = -3$, you should say underflow. Because $-12.34 \times 10^{-3} = -0.01234$ which cannot be represented in a linked list of 6 nodes.