NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

SC1007 Data Structures and Algorithms **2021/22 Semester 2**

Lab 5: Hash Table & Graph Representation

School of Computer Science and Engineering *Nanyang Technological University*

Q1 Implement a closed addressing hash table with modulo hash function (see the provided template) to perform insertion and key searching. The insertion may not have to insert at the end of the link-list. The function prototype is given below:

```
ListNode *HashSearch ( HashTable *, int) ;

int HashInsert ( HashTable * , int );
```

Q2 Write a function adjM2adjL() to convert an adjacency matrix to an adjacency list. The structure of a graph is given below (see the provided template also):

```
enum GraphType { ADJ_MATRIX , ADJ_LIST }; // Types of Graph Representation

typedef struct _listnode
{
  int vertex ;
  struct _listnode *next ;
} ListNode ;

union GraphForm {
  int **matrix ; // adjacency matrix
  ListNode **list ; // adjacency list
};

typedef struct _graph {
  int V;
  int E;
  enum GraphType type ;
  union GraphForm adj ;
} Graph ;
```

Q3 The degree of a vertex v of a graph is the number of edges incident on v. Write a function calDegreeV() to compute vertex degrees using adjacent lists. Please reuse the work done in Q2.

```
void calDegreeV ( Graph g , int *degreeV )
```