भारतीय सूचना प्रौद्योगिकी संस्थान गुवाहाटी

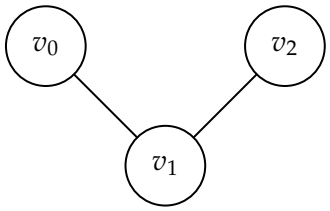
Indian Institute of Information Technology Guwahati

DATA STRUCTURES LAB (CS111)

ASSIGNMENTS–12

Assignments to be completed during lab sessions

1. The first and second lines of a text file contain the number of vertices (n_v) and the number of edges (n_e), respectively. Each of the next n_e lines contains two integers i an j separated by a white space, indicating (i, j) is an edge of the graph, where $i, j \in \{0, 1, 2, \ldots, n_v - 1\}$. As an example, let us consider the following graph:



To represent the graph, the content of the text file would be:

```
3
2
0 1
2 1
```

   i. Write a function to represent a graph using adjacency-matrix representation, assuming it is an undirected graph.
   ii. Write a function to represent a graph using adjacency-matrix representation, assuming it is a directed graph.
   iii. Write a function to represent a graph using adjacency-list representation, assuming it is an undirected graph.

iv. Write a function to represent a graph using adjacency-list representation, assuming it is a directed graph.

2. Write a program to perform the breadth-first search on a graph.
3. Write a program to perform the depth-first search on a graph.
4. Write a program to implement heap-sort.
5. Write a program to implement a priority queue using max heaps.