CSCE 411-502 Design and Analysis of Algorithms

Spring 2025

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Assignment # 3
(Due February 28)

1. Based on Breadth-First-Search, write algorithms that solve the following problems, respectively:
   (1) Given an undirected graph G, decide if G is connected.
   (2) Given an undirected graph G, decide if G is a tree.
   (3) Given an undirected graph G, decide if G is bipartite.
   (4) Given an unweighted and undirected graph G and two vertices v and w in
       G, either construct a shortest path from v to w in G, or report that there
       is no path from v to w in G.

2. Based on Depth-First-Search, write algorithms that solve the following problems, respectively:
   (1) Given an undirected graph G, decide if G is connected.
   (2) Given an undirected graph G, decide if G is a tree.
   (3) Given an undirected graph G, decide if G is bipartite.
   (4) Given an undirected graph G, either construct a cycle in G or report that G
       contains no cycle.