

**COMP 2230 – Data Structures and Algorithm Analysis**

Assignment #10: Sets, Maps and Graphs

## Due Date: Section 01 Nov. 28th Section 02 Nov 29th, 2024

**Chapter 22 Sets and Maps**

1. What is a set?

A set is a collection of elements that contain unique (no duplicates) values with a primary purpose of determining if an element exists in the collection.

1. What is a map?

A map is a collection that creates a relationship between a key and a value with the primary purpose of providing an efficient way of finding a value given its key. A map contains unique values and keys with one key matching the one value per key, but multiple keys can be mapped to the same value.

1. What is the difference between a set and a map?

The difference between a set and a map is the purpose of the collections, the map is made for finding values where the set is made for seeing if it exists.

TBC

1. Create a Set ADT (set class to hold integers using an array as the underlying data structure ) that has the following methods:
   1. add(int)
   2. remove(Int)
   3. boolean contains(int)

**Chapter 24 Graphs**

1. Draw the undirected graph that is represented as follows:

Vertices 1, 2, 3, 4, 5, 6, 7

Edges (1, 2), (1, 4), (2, 3), (2, 4), (3, 7), (4, 7), (4, 6), (5, 6), (5, 7), (6, 7)

A black and white drawing of a network

Description automatically generated

1. Is the graph from question 1 connected?

The graph is connected as all vertices have a path to each other.

1. List all the cycles in the graph from question 1.
2. Draw a spanning tree for the graph from question 1.

A black and white drawing of a network

Description automatically generated

1. Using question 1, draw the resulting directed graph.

A network diagram with lines and dots

Description automatically generated with medium confidence

1. Is the directed graph of question 5:
   1. Connected?

The directed graph is not connected as there is no from any 2 vertices to another as in 7 or 5 to 1 etc.

* 1. Complete?

Graph is incomplete since there is not the maximum edges connecting vertices such as no edge between 4 and 5 and no edge between 1 and 7 etc.

1. List all of the cycles in graph of question 5.

There are no cycles in the graph as no vertices can be both start and end

1. Draw a spanning tree for the graph of question 5.