

CS 3510 - Spring 2009
Homework 2
Due: March 2

You must hand in this homework. Please work alone on this assignment. As always, please show your work.

1. Problem 3.2 from [DPV]
2. Problem 3.3 from [DPV]
3. Problem 3.4 from [DPV]
4. Problem 3.12 from [DPV]
5. *Global sink:*
Let $G = (V, E)$ be a directed graph given its adjacency list representation. A vertex v is called a *global sink* if and only if:
 - (a) v has no outgoing edges
 - (b) for every other vertex w , there is a path from w to v .Give an algorithm that determines if G has a global sink and, if the answer is yes, returns the global sink. Your algorithm should have running time $O(|V| + |E|)$.
6. *Binary heap:*
Starting from an empty binary heap, perform the following sequence of operations, and draw the final binary heap data structure.
 - Insert a ; 7 (that is, an element a with key 7).
 - Insert b ; 4.
 - Insert c ; 9.
 - Insert d ; 12.
 - Insert e ; 10.
 - Insert f ; 3.
 - Decrease-key of e to 2.
 - Delete-min.
7. Problem 4.19 from [DPV]
8. Problem 4.21 from [DPV]