Basic Algorithms, Assignment 6

Due, Thursday, Oct 25

1. Consider the directed graph on $1, \ldots, n$ so that $\mathtt{Adj}[i]$ consists of the points $i+1, \ldots, n$ in that order. Describe what happens when the depth first search algorithm is run where the vertices themselves are in order $1, \ldots, n$. Describe when the vertices turn grey and then black. Define `GOODORDER` (as in the webnotes) as a stack which has (at the end) the vertices in reverse order of when they turned black. What will be the order of the stack `GOODORDER`.

2. Same question as above except that the vertices are in reverse order $n, \ldots, 1$.

3. Page 107, Exercise 1.

4. Consider the directed graph G on $1, 2, 3, 4, 5$ which has edges $(1, 2), (1, 3)$ (and no others). How many topological orders does it have?

5. Consider the graph on vertices $1, \ldots, 20$ with the following edges: $(i, i+1), 1 \leq i < 10$; $(10, 1)$; $(i, i+1), 11 \leq i \leq 20$; $(20, 1)$; $(5, 13)$. Draw a nice picture of this graph. What are its strong components. Draw the supergraph.

He rarely copied box scores into the Book, but today it seemed the right thing to do. All those zeroes! He decided for zeroes he'd use red ink. Zero: the absence of number, an incredible idea! Only infinity compared to it, and no batter could hit an infinite number of home runs - no, in a way, the pitchers had it better. Perfection was available to them.
The Universal Baseball Association, Inc., J. Henry Waugh, Prop.
– Robert Coover