1. Consider the following directed graph and answer the questions that follow:

![Directed Graph]

(a) (½ point) Is the graph a DAG?
(b) (1 point) How many SCCs does this graph have?
(c) (½ point) How many source SCCs does this graph have?
(d) (½ point) What is the distance of node H from the A?
(e) (½ point) What is the maximum distance of the vertex H from A?
   (Maximum distance is defined to be the length of the longest simple path.)
(f) (1 point) Suppose we run the DFS algorithm on the graph exploring nodes in alphabetical order. 
   Given this, what is the pre-number of vertex F?
(g) (1 point) Suppose we run the DFS algorithm on the graph exploring nodes in alphabetical order. 
   Given this, what is the post-number of vertex G?

2. In a video game, Mario needs to go from square 1 to square n, staying on safe squares. You are given an array Safe[1...n] which specifies whether the ith square is safe. It is given that squares 1 and n are safe. Mario can either step 1 square forward or jump 3 squares forward. Suppose steps cost 1 unit of energy, and jumps cost 6 units of energy. We want to find the minimum amount of energy Mario needs to reach square n safely?

We will solve this problem by reducing this problem to a graph problem. That is, you need to define an appropriate graph and then use a known graph algorithm. Answer the questions related to this reduction below:

(a) (1 point) What are the vertices of your graph?
(b) (1 point) What are the edges of your graph?
(c) (½ point) How many vertices could there be, in big-O notation? Give brief explanation.
(d) (½ point) How many edges could there be, in big-O notation? Give brief explanation.
(e) (1 point) What algorithm would you run on the graph you described to solve the original problem?
(f) (1 point) In big-O notation, how long would this approach take? Give brief explanation.