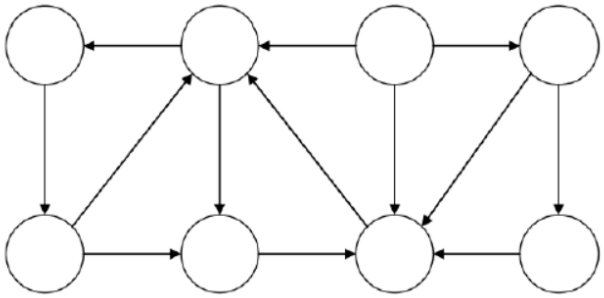
Algorithm 2017 Spring

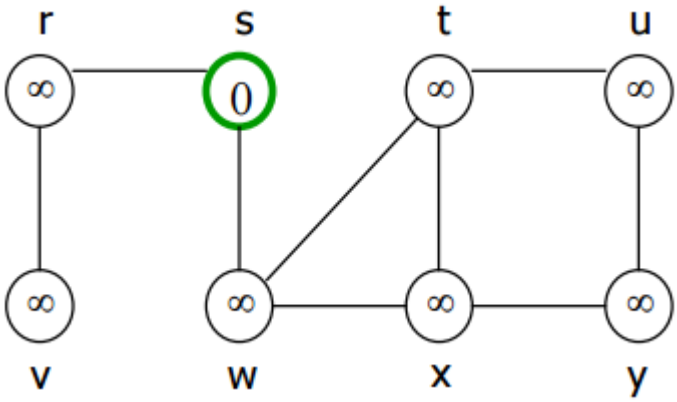
Quiz

範圍：Chapter 8~ Chapter 23

1. **(20pts) Given the following graph.**
   - **(a) (10pts) Is the graph acyclic?**
   - **(b) (10pts) Explain your reason.**

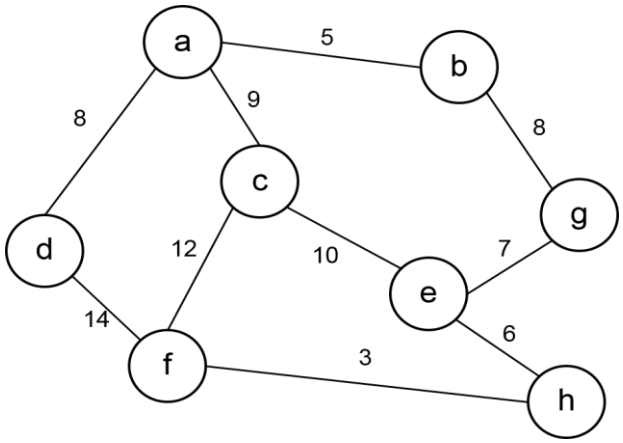


2. **(20pts) Given the following graph.**
   - **(a) (10pts) Illustrate breadth-first search.**
   - **(b) (10pts) Illustrate the progress of breadth-first search (BFS) on the following sample graph.**



3. **(20pts) Show, by means of a counterexample, that the following "greedy" strategy does not always determine an optimal way to cut rods. Define the density of a rod of length i to be p_i, that is, its value per inch. The greedy strategy for a rod of length n cuts off a first piece of length i, where $1 \leq i \leq n$, having maximum density. It then continues by applying the greedy strategy to the remaining piece of length $n - i$**

4. **(20pts) For the following graph,**
   - (a) **(10pts) What is the minimum-cost spanning tree? Please draw the minimum-cost spanning tree and write down the cost.**
   - (b) **(10pts) Write an algorithm to describe how you get the result of (A).**



5. **(20pts) In the algorithm SELECT, the input elements are divided into groups of 5.**
   - (a) **(10pts) What is the purpose of this algorithm?**
   - (b) **(10pts) Will the algorithm work in linear time if they are divided into groups of 7?**