



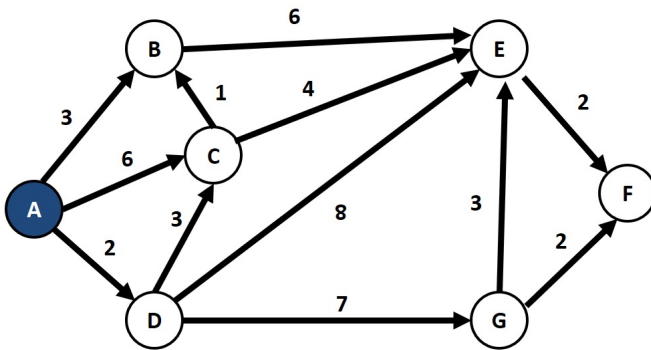
## COS 226–Algorithms and Data Structures

### Week 8: *Shortest Path*(Algs. §4.4)

Version: April 10, 2018

#### Exercise 1 – Shortest Paths (Dijkstra)

A. Consider the following edge-weighted digraph.

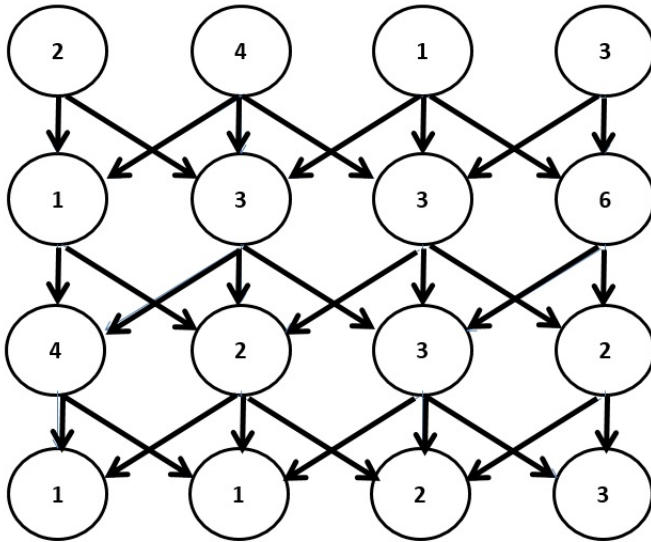


Suppose we start with the source vertex A. Using Dijkstra’s algorithm complete the table below until the first 6 vertices are removed from the priority queue.

vertex	A	B	C	D	E	F	G
distTo							
edgeTo							

**Exercise 2 – Shortest Path for SeamCarver**

Consider the directed acyclic graph below. Instead of weights on the edges, we introduce weights on the vertices. In the context of seam carver assignment, you can assume this to be the graph that represents energies that your program will calculate for a small 4x4 (wxh) image.



- A. Find a path that minimizes the total weight from any vertex in the first row to any vertex on the bottom row in the given graph.
- B. Discuss how Dijkstra's algorithm can be applied to find a path that minimizes the total weight from any vertex in the first row to any vertex on the bottom row.
- C. Assume that there are  $n$  vertices in the graph and outdegree of each vertex is at most 3. What is the order of growth of your algorithm in terms of  $n$ ?