# CS5200: Assignment 4

## 1 Amortized analysis (8 pts)

1. Analyze the amortized cost for k bit counter (page 31 of the lecture slides) using both aggregate method and accounting method. (4 pts)

2. Suppose we perform a sequence of stack operations on a stack whose size never exceeds k. After every k operations, we make a copy of the entire stack for backup purposes. Show that the cost of n stack operations, including copying the stack, is O(n) by assigning suitable amortized costs to the various stack operations (PUSH and POP). (4 pts)

## 2 Graph basics (12 pts)

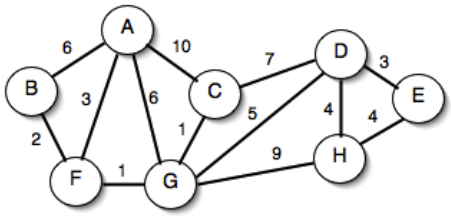


Figure 1: An undirected graph.

1. Answer the following questions for the graph in Fig. 1. (4 pts)
1) Show the adjacency list and adjacency matrix of the graph. (2 pts)
2) Show the DFS and BFS traversal from node E. Follow alphabetically order if multiple choices are available. (2 pts)

2. Design an algorithm and analyze its complexity for word ladder. (4 pts)

3. Design an algorithm and analyze its complexity for max path sum. (4 pts)