- 1. Donald Knuth is a VIP in the world of algorithms. Let's talk about him.
- 2. What does *amortize* mean?
- 3. Suppose we are implementing ArrayList, starting with a capacity of 5 elements, and increasing the size as needed. If we start with an empty ArrayList and add elements one at a time until we get N elements, (we don't know N in advance), what is the amortized cost of adding each element if we use the following strategies for resizing the array?
  - add one element to the capacity each time

- double the capacity each time (you may assume that N is one more than 12 times a power of 2)

- 4. What is a brute force algorithm?
- 5. According to the Levitin textbook, what are the three flavors of decrease-and-conquer algorithms?
  - a
  - b
  - 0
  - c

- 6. Some "decrease by one" algorithms:
  - a. Insertion sort, Selection Sort
  - b. Depth-first search of a graph, breadth-first search of a graph
  - c. Subset generation, permutation generation
- 7. Breadth-first search and depth-first search are graph traversal algorithms.
  - a. Depth-first search (DFS) uses a stack to keep track of unvisited nodes; breadth-first (BFS) uses a queue.
  - b. Analogous to pre-order and level-order traversals of a tree.
  - c. DFS goes deep, quickly. BFS searches nearby nodes first.
  - d. In a connected, undirected graph, both generate a tree and "back edges".
- 8. For the following undirected graph, do a DFS search (starting at a, and always preferring nodes whose names come earlier alphabetically). Show the stack, and the order of pushes and pops.



9. For the same undirected graph, do a BFS search (starting at a, and always preferring nodes whose names come earlier alphabetically). Show the queue, and the order of enqueues and dequeues.

