CSCI 237 Data Structures and Algorithms
Fall 2017
Test 1
50 minutes

CORRECTION

Name:_____

Q1(10). Precisely describe the meaning of the set $O(g(n)) \cap \Omega(g(n))$.

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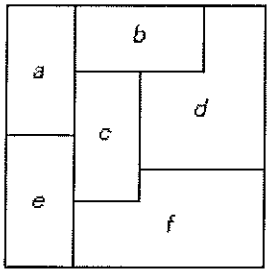
Q2(10). Show the queue after each operation of the following sequence that starts with the empty queue:
enqueue(a), enqueue(b), enqueue(c), dequeue, dequeue, enqueue(d), dequeue

Q3(10). Is $2^{n^2} \in \Omega(2^{n^3})$ true? **Prove** your answer.

Q4(10). Represent the following map as a graph. Treat the labels a, b, c, d, e, f as vertices.



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Q5(10). Find the growth order for solutions of the recurrence relation $T(n) = 18T\left(\frac{n}{2}\right) + n^c$, *where* $1 \leq c \leq 4$ *is a constant* $T(1) = 1$, using master theorem.

Q6(10). What is the maximum number of divisions made by Euclid's algorithm among all inputs $1 \leq m, n \leq 10$?

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Q7(20). Use QuickSort algorithm to sort the input array 23 81 17 11 33 25 46 54. Show each iteration of the method. Use the Partition method of using value in the left most index of the sub-array to be sorted as the pivot (Hoare's method of partition).

Q8(15). (a) Show the stack after each operation of the following sequence that starts with the empty stack: push(a), push(b), pop, push(c), push(d), pop

(b) Show the queue after each operation of the following sequence that starts with the empty queue: enqueue(a), enqueue(b), dequeue, enqueue(c), enqueue(d), dequeue