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1) a) True

b) True

c) True

d) True

e) False

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2) a) The unexpected time to search unsuccessfully for a key k is the expected time to search to the end of list $T[h(k)]$, which has expected length $E[n_{h(k)}] = \alpha$. Thus, the expected # of elements examined in an unsuccessful search is α, & the total time required is $\Theta(1+\alpha)$

Page 259 copied exact of textbook

b) No because its random (Randomized Quicksort)

c) Page 309, ch. 13.1

Prove by using induction on the height of x.
$x=0$, then x = leaf & there are 0 nodes.
Apply inductive hypothesis to conclude each child has $2^{bh(x)-1}$ internal nodes.

Meaning: x has $(2^{bh(x)-1} - 1) + (2^{bh(x)-1} - 1) + 1 = 2^{bh(x)}$

proving the claim.

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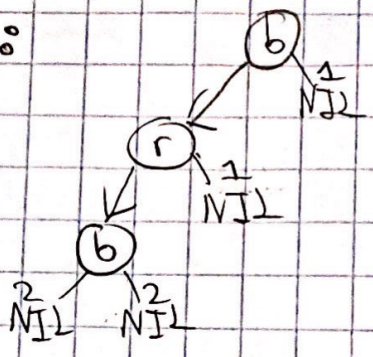
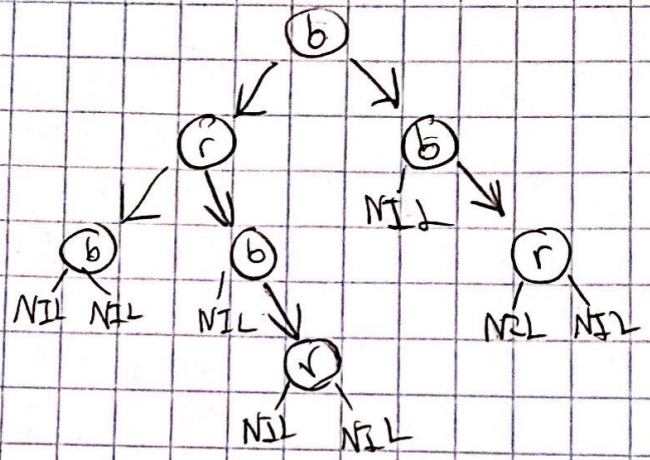
Ch. 13

3) Tree 1:



Impossible

Tree 2:



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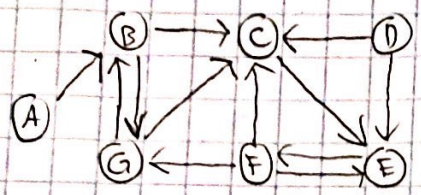
4)

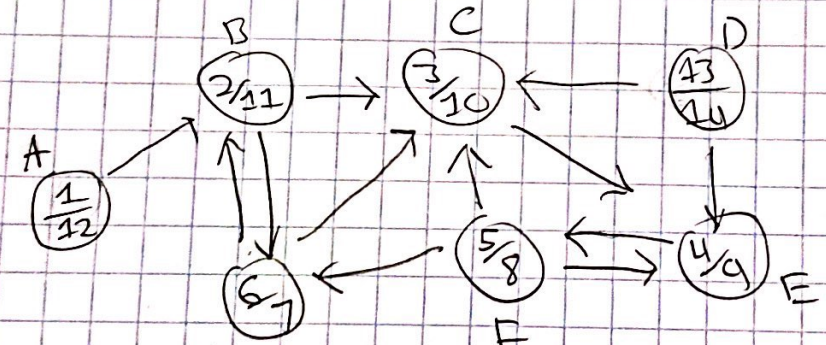


a)
A → B
B → C → G
C → E
D → C → E
E → F
F → C → E → G
G → B → C

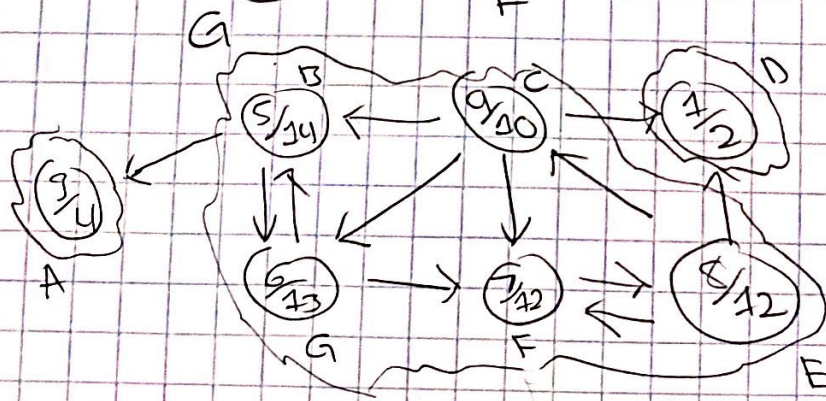
b)

	A	B	C	D	E	F	G
A	0	1	0	0	0	0	0
B	0	0	1	0	0	0	1
C	0	0	0	0	1	0	0
D	0	0	1	0	1	0	0
E	0	0	0	0	0	1	0
F	0	0	1	0	1	0	1
G	0	1	1	0	0	0	0

c)

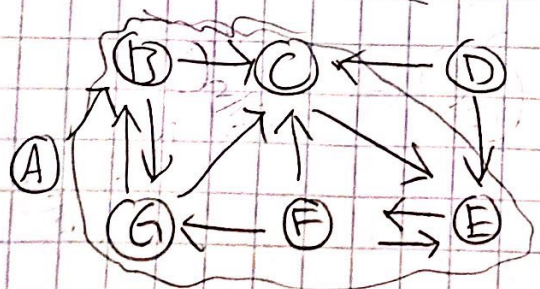


d)



{A}, {B, C, E, F, G}, {D}

e)



{B, C, E, F, G}

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5)

0	
1	
2	
3	23, 3, 13
4	
5	15, 5
6	
7	
8	
9	29

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6) a) The expected time to search for a key is O(1) because constantly hashing. Ch. 11

b) No, you would not use BST because its constantly hashing.

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7) QuickSort(A, p, r)
if p < r
q = Partition(A, p, r)
Quicksort (A, p, q−1)
Quicksort (A, q+1, r)

Ch. 7.1
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To sort entire array A, the initial call is QuickSort(A, 1, A.length)

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8) The linear time algo would run at O(

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9)