R.2.7

S : create Vector () .

Algorithm root (S)
    return S.elemAtRank(1)

Algorithm parent (p)
    return S.elemAtRank(p/2)

Algorithm leftChild (p)
    return S.elemAtRank (p*2)

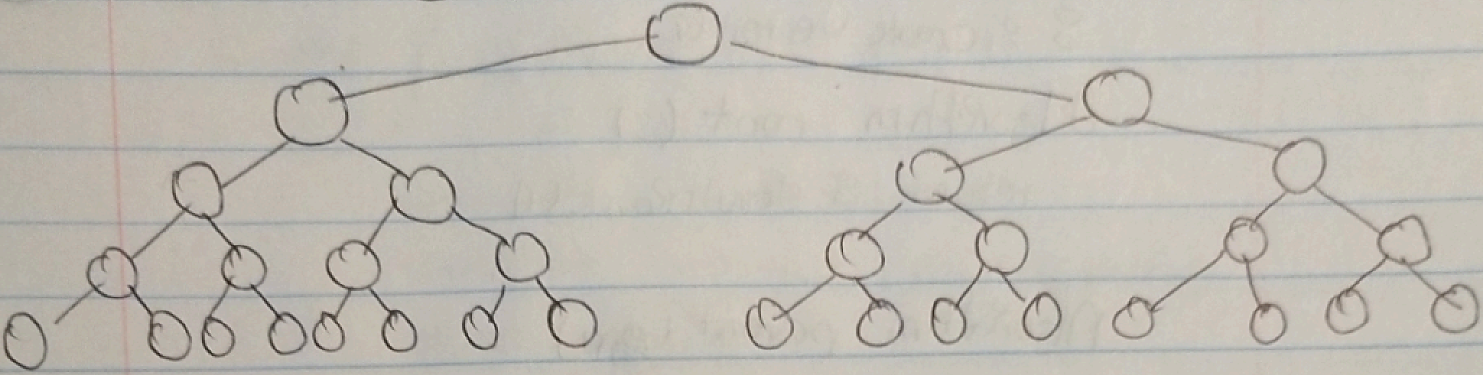
Algorithm rightChild (p)
    return S.elementAtRank(p*2+1)

Algorithm isInternal (p)
    return leftChild(p) != null || rightChild(p) != null

Algorithm isExternal(p)
    return ! isInternal(p)

Algorithm isRoot (p)
    return p == S.elemAtRank(1)

R2.8. (a)



(b) • $e = i + 1 \rightarrow i = e - 1$

e: Externo, i: Interno

• $h \le i \rightarrow h \le e - 1 \rightarrow h + 1 \le e$

h: height

(c) $e \le 2^h \rightarrow$

For example we can replace $h = 2$

min $h + 1 \le e \rightarrow 3 \le e$

max $e \le 2^h \rightarrow e \le 4$

(d) $n = i + e$

$\log_2(n+1) - 1 \le h \le \underbrace{(n-1)/2}$

$\log_2(n+1) - 1 \le h \le i \Rightarrow n = 31$

$\log_2 32 - 1$

$\log_2 2^5 - 1 \le h \le (n-1)/2$

$4 \le h \le 15$

The lower bound of T is greater than 4

The upper bound of T is less than 15

internal node 15/2

R-2.2

e. For which values of n and h can the above lower and upper bounds on h be attained with equality?

When $n = 3$

the upper bound → $(3-1)/2 = 1$

the lower bound → $\log_2(3+1) - 1 = 1$

$\log_2 2^2 - 1 = 1$

C2.2 Analize the queue implementation ADT using stacks from Assinement 2.1

Amortized Runtime	action	actual
2	enqueue (a)	1
2	enqueue (b)	1
2	enqueue (b)	1
2	enqueue (d)	1
1	deque()	5
1	deque()	1
10		10

2.7

Array	Linked List	Algorithm suffleDeck (S)
1	1	pointcheck = S.size − 1
n	n	while pointcheck > 0 do
n	n^2	random := S.rankOf(randomInt(pointcheck + 1))
n	n^2	current := S.rankOf(pointcheck)
n	n	S.swapElements(random, current)
n	n	point Check = point check − 1
n	(n^2)	return S