Week3 HW

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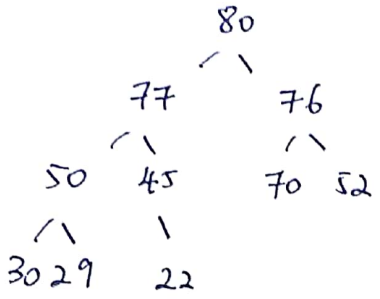
Q1:



By Max(Min) Heap property, the key of node is ≥ or ≤ than the key of its children.

The array forms a heap (True)

Q2: False True

① If we insert m elements at the same time, ~~the~~ we can see the array as an unordered array, hence the complexity to ~~+~~ build max heap is O(m+n)

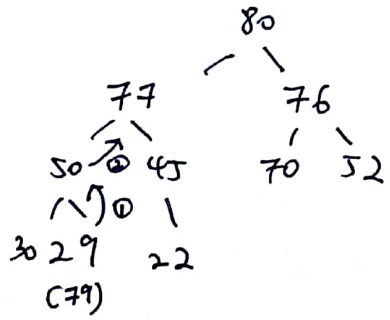
② To insert one element we first place the element in the X position, since it may violate the Max heap property, we need to do heapify which complexity is O(log n)

Hence the whole process to insert m elements (one by one) is O(~~m log n~~) (m log(m+n))

$T(n) = \underbrace{\log(n+1) + \log(n+2) + \log(n+3) \cdots \log(m+n)}_{m \text{ elements.}}$ (log(m+n) is the largest item.)

∴ the complexity is m log(m+n)

Q3: original heap



if 29 is increased to 79.

swap ① 50 ⇐⇒ 79 swap ② 77 ⇐ 79 no more violation on property.

hence 2 swaps ~~is~~ are needed.

Q4: AC

Q5: B