Q5.1 Base case: height = 0 $\Rightarrow$ Nodes = 1 >= 2·0 + 1 True

Q5.2 Assume that for all full binary trees with height $\leq h$, we have

#nodes $\geq$ 2(height) + 1

Q5.3 Let T be a non-binary subtree with height $h+1$. Then T has a root and two subtrees, L, R with height l, r. Since the max height of the subtrees is h, we have $\max(l, r) = h$. Since L, R have height at most h, we know that the # nodes (L) $\geq 2l+1$, #nodes (R) $\geq 2r+1$

$\therefore$ # nodes (T) = 1 + # nodes (L) + # nodes (R) $\geq 1 + (2l+1) + (2r+1) = 2(l+r) + 3$

However, we have $\max(l,r) = h \Rightarrow l + r \geq h$

$\therefore$ # nodes (T) $\geq 2(h) + 3 \geq 2(h+1) + 1$ = 2 · Height (T) + 1 and we are done.