Statement P. Maximally decreased tree of degree is F\_K+2 for k>= 0

Base case:

K=0

Maximally decreased tree of degree k is:

F\_0 + 2 = F\_2 = 1

K = 1

F\_(1+2) = F\_3 = 2

Hence holds for P(1)

Inductive hypothesis:  
Assume P(K) is true for all values up to and including K for some K >= 1.

Inductive step: Prove that it is true for P(K+1)

When going from a (not decreased) binomial tree of degree K to K+1, the new child of the root will be a binomial tree of size Bk-1. Under each binomial tree are binomial trees subtrees of size b0 to bk-1. The size of each tree increases with the increase to the degree. For each subtree (except the tree overall), one and only one child can be removed when maximally decreasing. When the b\_k-1 tree is added, the biggest child should be removed. This removes the b\_k-2 child under it which turns the b\_k-1 tree into a b\_k-2 tree. This tree can no longer lose any of the children of the root as it has already been marked, therefore when maximally decreased, this tree will be the same as P(k-2). Therefore when going to the next tree, we have in essence added P(k-2) nodes to the P(K-1) tree.