Third Homework — Algorithms

The number of parenthesizations of a matrix chain product with n matrices follows the recursion

$$P(n) = \begin{cases} 1 & \text{if } n \in 1,2 \\ \sum_{k=1}^{n-1} P(k)P(n-k) & \text{if } n \geq 3 \end{cases}.$$

Show using induction that $P(n) \geq 2^{n-3}$.