

### A Question of Some Depth

Let  $T$  be a  $k$ -ary tree, i.e. each internal node of  $T$  has at most  $k$  children. Suppose that the depth of  $T$  is  $d$  (the maximum depth of any node of  $T$  is  $d$ ). What is the maximum number of *external nodes (leaves)* that  $T$  can have? What is the maximum *total* number of nodes that  $T$  can have?

### The Big Swap

Suppose that  $x$  and  $y$  are two integer variables. How can I swap the values of  $x$  and  $y$  without using a third temporary variable?

(The usual way to do this swap is to do something like

$$\begin{aligned}temp &\leftarrow x \\x &\leftarrow y \\y &\leftarrow temp.\end{aligned}$$

Here we want to avoid using this extra variable. What can we do instead to achieve this swap?)