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

\[
\begin{align*}
temp & \leftarrow x \\
x & \leftarrow y \\
y & \leftarrow temp.
\end{align*}
\]

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