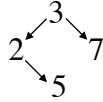474 An implementer's variable A holds a binary tree representation as follows. If the tree is empty, $A = [nil]$. If the tree has left subtree L and right subtree R and root value n , then $A = [L; n; R]$. The tree

is represented as $A = [[[nil]; 2; [[nil]; 5; [nil]]]; 3; [[nil]; 7; [nil]]]$. The tree must be reimplemented using implementer's variable B as follows. If the tree is empty, $B = 0$. If the tree has left subtree L and right subtree R and root value n , then

$B = \text{"left"} \rightarrow L \,|\, \text{"root"} \rightarrow n \,|\, \text{"right"} \rightarrow R$

The same example tree is represented as

$B = \quad \text{"left"} \rightarrow \quad (\text{"left"} \rightarrow 0$
$\qquad\qquad\qquad |\, \text{"root"} \rightarrow 2$
$\qquad\qquad\qquad |\, \text{"right"} \rightarrow \quad (\text{"left"} \rightarrow 0$
$\qquad\qquad\qquad\qquad\qquad\quad |\, \text{"root"} \rightarrow 5$
$\qquad\qquad\qquad\qquad\qquad\quad |\, \text{"right"} \rightarrow 0\,)\,)$
$\qquad\quad |\, \text{"root"} \rightarrow 3$
$\qquad\quad |\, \text{"right"} \rightarrow \quad (\text{"left"} \rightarrow 0$
$\qquad\qquad\qquad\qquad\quad |\, \text{"root"} \rightarrow 7$
$\qquad\qquad\qquad\qquad\quad |\, \text{"right"} \rightarrow 0\,)$

(a)   What is the data transformer?

(b)   A user has natural variable n and the operation

$root \;=\; n := A\,1$

which assigns to n the root value. Use your transformer from part (a) to transform $root$.

no solution given