

## A Subtle Point

The formula

$$\begin{aligned} &\wedge \forall i \in \text{DOMAIN } A : A'[i] = (\text{IF } i = 3 \text{ THEN } 42 \text{ ELSE } A[i]) \\ &\wedge (\text{DOMAIN } A') = (\text{DOMAIN } A) \end{aligned}$$

does not imply that  $A'$  is a function. If  $v$  is not a function, then the values of  $\text{DOMAIN } v$  and  $v[x]$  for some number  $x$  are not specified. The semantics of  $\text{TLA}^+$  does not rule out the possibility that this formula is satisfied if  $A'$  equals  $\sqrt{43}$ . (The semantics also does not say whether or not  $\sqrt{43}$  is a function.)

To turn this formula into a correct specification of the assignment statement, we have to add the requirement that  $A'$  is a function. This requirement is expressed by the formula

$$A' = [i \in \text{DOMAIN } A' \mapsto A'[i]]$$

Can you see why?