

Reasoning Table for goToTheRear

Use: $T.Init(x)$ as a predicate to state that variable x has initial value

6 assertions that were filled in

```
goToTheRear(QueueOfT& q);
! updates q
! requires |q| > 0
//! ensures q = #q[1,|#q|) * #q[0,1)
```

State	Code	Assume	Confirm
0		A0: $ q0 > 0$	C0: true This true is requires clause from Type T's constructor
	<code>T y;</code>	////	////
1		A1: $T.Init(y1) \wedge q1 = q0$	C1: $q1 \neq \langle \rangle$
	<code>q.dequeue(y);</code>	////	////
2		A2: $\langle y2 \rangle \text{ is prefix of } q1 \wedge q2 = q1[1, q1)$	C2: True This true is requires clause from enqueue
	<code>q.enqueue(y);</code>	////	////
3		A3: $q3 = q2 * \langle y2 \rangle \wedge T.Init(y3)$	C3: $q3 = q0[1, q0) * q0[0,1)$

4 VCs that were generated

VCs written using **A0, A1, A2, and A3** cell labels

VC Format: *antecedent* \rightarrow *consequent*

VC0: $A0 \rightarrow \text{true}$

VC1: $(A0 \wedge A1) \rightarrow q1 \neq \langle \rangle$

VC2: $(A0 \wedge A1 \wedge A2) \rightarrow \text{true}$

VC3: $(A0 \wedge A1 \wedge A2 \wedge A3) \rightarrow q3 = q0[1, |q0|) * q0[0,1)$

Where:

$A0 = |q0| > 0$

$A1 = T.Init(y1) \wedge q1 = q0$

$A2 = \langle y2 \rangle \text{ is prefix of } q1 \wedge q2 = q1[1, |q1|)$

$A3 = q3 = q2 * \langle y2 \rangle \wedge T.Init(y3)$