

Reasoning Table for dequeueTwo

```
void dequeueTwo(QueueOfT& q, T& y, T& z);
```

```
    //! updates q
```

```
    //! replaces y, z
```

```
    //! requires    |q| > 1
```

```
    //! ensures    q = #q[2,|#q|) and <y> is prefix #q and <z> is prefix #q[1,|#q|)
```

State	Code	Assume	Confirm
0		S0F: $ q_0 > 1$	$q_0 \neq \langle \rangle$
	<code>q.dequeue(y);</code>		
1		S1F: $\langle y_1 \rangle$ is prefix of q_0 and $q_1 = q_0[1, q_0)$	$q_1 \neq \langle \rangle$
	<code>q.dequeue(z);</code>		
2		S2F: $\langle z_2 \rangle$ is prefix of q_1 and $q_2 = q_1[1, q_1)$ and $y_2 = y_1$	$q_2 = q_0[2, q_0)$ and $\langle y_2 \rangle$ is prefix q_0 and $\langle z_2 \rangle$ is prefix $q_0[1, q_0)$

VCs (Verification Conditions):

1) $|q_0| > 1 \rightarrow q_0 \neq \langle \rangle$

2) $|q_0| > 1$ and $\langle y_1 \rangle$ is prefix of q_0 and $q_1 = q_0[1, |q_0|) \rightarrow q_1 \neq \langle \rangle$

3) $|q_0| > 1$ and $\langle y_1 \rangle$ is prefix of q_0 and $q_1 = q_0[1, |q_0|)$ and $\langle z_2 \rangle$ is prefix of q_1 and
 $q_2 = q_1[1, |q_1|)$ and $y_2 = y_1$

$\rightarrow q_2 = q_0[2, |q_0|)$ and $\langle y_2 \rangle$ is prefix q_0 and $\langle z_2 \rangle$ is prefix $q_0[1, |q_0|)$

VCs: using SxFs

1. $S1F \rightarrow q_0 \neq \langle \rangle$

2. $S1F \wedge S2F \rightarrow q_1 \neq \langle \rangle$

3. $S1F \wedge S2F \wedge S3F \rightarrow q_2 = q_0[2, |q_0|)$ and $\langle y_2 \rangle$ is prefix q_0 and $\langle z_2 \rangle$ is prefix $q_0[1, |q_0|)$