A limited queue is a queue with a limited number of places for items. Let the limit be positive natural $n$, and let $Q: [n*X]$ and $p: nat$ be implementer's variables. Here is an implementation.

- **mkemptyq** \( \equiv p := 0 \)
- **isemptyq** \( \equiv p = 0 \)
- **isfullq** \( \equiv p = n \)
- **join x** \( \equiv Q p := x. \ p := p + 1 \)
- **leave** \( \equiv \text{for } i := 1..p \text{ do } Q(i-1) := Q i \text{ od. } p := p - 1 \)
- **front** \( \equiv Q 0 \)

Removing the front item from the queue takes time $p - 1$ to shift all remaining items down one index. Transform the queue so that all operations are instant.

$\S$ see book Subsection 7.2.3