### Queues

Another form of list: First in, First out (FIFO)

- **push(x)/insert/append/enque** – add x to the end of the list.
- **pop/delete/serve/deque** – remove the first element in the list.
- **front/get/retrieve** – return the first element in the list.
- **empty** – return True if the list is empty.
- **size** – return the number of elements in the list.

### Queue Specification

**Description** A FIFO list.

**State** q: A sequence of type T.

**Operations**
- **queue()** Constructor.
  - **Post:** q = [], q is the empty sequence.
- **~queue()** Destructor.
- **push(T x)** Mutator. Adds x to the back of the queue.
  - **Post:** q' = q ∪ x is appended to q
- **pop()** Mutator. Removes the front element.
  - **Pre:** |q| > 0, The queue is not empty.
  - **Post:** q' = q[1⋯|q|−1], The first element of q is removed.
- **T front()**
  - Accessor. Returns the front element of the queue.
    - **Pre:** |q| > 0, The queue is not empty.
    - **Post:** Result = q₀ ∧ q' = q, The first element of q is returned and q is unchanged.
- **Bool empty()**
  - Accessor. Returns True if the queue is empty, false otherwise.
    - **Post:** Result = (|q| = 0) Returns true if the length of q is 0, false otherwise.
- **int size()**
  - Accessor. Returns the length of the queue.
    - **Post:** Result = |q| Returns the length of q.