

- R-6.7** Suppose an initially empty queue Q has performed a total of 32 enqueue operations, 10 first operations, and 15 dequeue operations, 5 of which returned null to indicate an empty queue. What is the current size of Q ?
- R-6.8** Had the queue of the previous problem been an instance of the `ArrayQueue` class, from Code Fragment 6.10, with capacity 30 never exceeded, what would be the final value of the instance variable `f`?
- R-6.9** What values are returned during the following sequence of queue operations, if executed on an initially empty queue? `enqueue(5)`, `enqueue(3)`, `dequeue()`, `enqueue(2)`, `enqueue(8)`, `dequeue()`, `dequeue()`, `enqueue(9)`, `enqueue(1)`, `dequeue()`, `enqueue(7)`, `enqueue(6)`, `dequeue()`, `dequeue()`, `enqueue(4)`, `dequeue()`, `dequeue()`.
- R-6.10** Give a simple adapter that implements the stack ADT while using an instance of a deque for storage.
- R-6.11** Give a simple adapter that implements the queue ADT while using an instance of a deque for storage.
- R-6.12** What values are returned during the following sequence of deque ADT operations, on an initially empty deque? `addFirst(3)`, `addLast(8)`, `addLast(9)`, `addFirst(1)`, `last()`, `isEmpty()`, `addFirst(2)`, `removeLast()`, `addLast(7)`, `first()`, `last()`, `addLast(4)`, `size()`, `removeFirst()`, `removeFirst()`.

Answers

R-6.7 The current size of Q is 17.

R-6.8 The final value of the instance variable `f` is: 14.

R-6.9 The returned values are: 5, 3, 2, 8, 9, 1, 7, 6.

R-6.10 The implementation would be:

```
private ArrayDeque<E> deque = new ArrayDeque<>();

public E push(E element) {
    deque.addLast(element);
    top++;
    return element;
}

public E pop() {
    if (isEmpty()) {
        return null;
    }
    top--;
    return deque.removeLast();
}
```

R-6.11 The implementation would be:

```
public void enqueue(E element) {
    if (isFull())
        throw new IllegalStateException("Queue is Full");
    deque.addLast(element);
    counter++;
}

public E dequeue() {
    if (isEmpty())
        return null;
    counter--;
    return deque.removeFirst();
}
```

R-6.12 The returned values are: 9, false, 9, 2, 7, 6, 2, 7.