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.