

# Exercise Sheet 14

1. Given are the following classes, which are supposed to describe a normal doubly-linked list.

```
public class DLHead {

    private class DLNode {
        DLNode prev, next;
        Object elem;
    }

    private DLNode first, last;

    public void add( Object obj ) { /* ... */ }
    public Object getFirst() { return first.elem; }
    public void removeFirst() { /* ... */ }
    ...
}
```

Specify invariants for classes DLHead and DLNode to ensure that the resulting data structure is indeed a doubly-linked list.

