# Assignment 6

May 23, 1996

## 1 Due Date

May 30, 1996. Please turn in your solution at the beginning of the lecture.

## 2 Java

Implement flat lists of integers in Java. You should do this by defining a class `List` with subclasses `EmptyList` and `Pair`.

The class `List` should have the following methods:

- `cons` which returns a new properly initialized `Pair` object.
- `length` which returns the number of elements in the list.
- `car` and `cdr` which either raise the exception `EmptyListE` or return the corresponding component of the list.

Here is a small class to test your implementation:

```
class Test {
  public static void main (String args []) {
    List l1 = new EmptyList();
    List l2 = l1.cons(1);
    List l3 = l2.cons(2).cons(3).cons(4).cons(5);

    int i = l3.length();

    System.out.println("length = " + i);

    try { System.out.println("l3.cdr.cdr.car = " + l3.cdr().cdr().car()); }
    catch (EmptyListE e)
      { System.out.println("Attempt to dereference an empty list"); }

    try { System.out.println("l2.cdr.cdr.cdr.car = "
     + l2.cdr().cdr().cdr().car()); }
    catch (EmptyListE e)
      { System.out.println("Attempt to dereference an empty list"); }

  }
}
```

To run this test, compile the code using `javac file.java`, and then run the program using `java Test`. If your implementation is correct, this should produce the following output:

```
length = 5
l3.cdr.cdr.car = 3
Attempt to dereference an empty list
```