Cmp Sci 187: Programming with Data Structures
Lists

1. Java Generics

Code fragments to illustrate generics from Ref: Gilad Baracha – Generics Tutorial

```
List<Integer> lint = new ArrayList<Integer>();     //1
lint.add(new Integer(100));                        //2

Iterator<Integer> intIter = lint.iterator();       //3
Integer i1 = intIter.next();                       //4

lint.add(101);                                     //5
int i2 = intIter.next();                           //6

public class X { public X();}                      //7
public class Y extends X { public Y();}            //8

List<X> lx = new ArrayList<X>();                   //9
List<Y> ly = new ArrayList<Y>();                   //10
lx = ly;                                           //11

System.out.println(lx.getClass()==ly.getClass());  //12

void printCollection(Collection c) {               //13
  Iterator i = c.iterator();
  while(i.hasNext()) {
    System.out.println(i.next());
  }
}

void printCollection(Collection<Object> c) {       //14
  for (Object o: c) {
   System.out.println(o);
  }
}
```

Will lines **1** through **11** compile correctly?

What is the output of line **12**?

Is code segment beginning at line **14** equivalent to the one beginning at line **13**? What other variations are possible? Is it useful?

Cmp Sci 187: Programming with Data Structures Lists

2. Inner Classes

Code fragments to illustrate access in inner classes. Will the following code snippets compile?

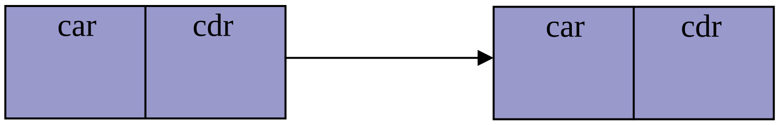
```
public class X {                                                  //1
  private int fx;

  public class I {
    int fi;
    public I() { fi = fx; }
  }
}

public class X {                                                  //2
  private int fx;
  private I i = new I();
  private int fx2 = i.fi;

  public class I {
    private int fi;
    public I() { fi = fx; }
  }
}

public class X {                                                  //3
  int fx;

  public static class I {
    int fi;
    public I() { fi = fx; }
  }
}
```

Cmp Sci 187: Programming with Data Structures Lists

3. DisInherit Methods

Is it possible for a class to disinherit methods ? Why or why not?

4. Lisp List Implementation



We want to implement a list similar to the one defined in **Lisp** language using a single **`class Cons`** which represents a **`cons`** cell as shown in the figure above. The car[1] field contains the data element and the cdr field points to the remaining list or is null. This has the nice property that if we take any sub-list, it is a list too. We want constructors that can construct an empty list or one from a given list. We want to define two operations on the list **`first()`** (or **`car()`**) that returns the cell element from the head of the list and **`rest()`** (or **`cdr()`**) that returns the remaining list. Both of these do not modify the original list. Another method we want is **`length()`** that returns the number of cells in the list.

First, write a **`LispList`** interface for this datatype and next write a skeleton for the **`Cons`** class.

5. List Of Arrays

We saw in the phone directory example the need for a data structure that supports addition and removal of elements from it. The implementation that was used there was an array but it had the disadvantage that if we ran out of space, we had to reallocate the array and copy elements over. A hybrid data structure List of Arrays is a list that contains an array as the data element. What advantages such a data structure may have? Sketch an implementation of this data structure.

1The names are a legacy of the architecture of **Lisp** implementations.