Please fill in you	r Student Number and, optionally, Name.	For Official Use
Student Number	:	Mark :
Name	:	Marker :

# University of Cape Town ~ Department of Computer Science

# Computer Science 1016S ~ 2007

# **Theory Test 2A**

Question	Mark	Marker
1		
2		
3		
4		
Total		

Marks: 30Time: 40 minutesInstructions:a)Answer all questions.b)Write your answers in the space provided.

c) Show all calculations where applicable.

#### Question 1: UML [10 marks]

a) Draw a UML class diagram to describe a booking system of a travel agent. In this system, a customer can go from a city to another by an aeroplane or a car and he/she can pay by cash or credit card

Requirements: there should be at least 6 concrete classes and 2 abstract classes with all the following links: inheritance, association, aggregation, multiplicity and navigation

The booking class diagram should have at least 2 attributes and 2 operations (those you consider are most important)

Answer:

## **Question 2: Cloneable Interface [10 marks]**

a) Explain what a Cloneable interface is and what it is for? Answer:

[2 marks]

**b)** Why is a CloneNotSupportedException needed in the above code and when does this exception occur?

Answer:

```
c) Given the following code
```

```
public class MyClass
{
    int code;
    String name;
    Person student;
    Person teacher;
    .....
```

}

Rewrite the above code so that we can make deep copies of MyClass objects

Answer:

[6 marks]

### **Question 3: Generic ArrayList [5 marks]**

```
a) Convert the following class AList into a generic class
import java.util.*;
public class AList {
   private ArrayList II;
   public AList() {
     II = new ArrayList();
   }
  public void append(Object item) {
     II.add(item);
   }
  public Object get(int index) {
     II.get(index);
   }
  public Object[] toArray() {
     return II.toArray();
   }
}
```

Answer:

[3 marks]

**b)** Give an code example of using your new defined generic class from question 3.a <u>Answer:</u>

public static void main(String[] args) {

//write your code here

}

## Question 4: [5 marks]

**a)** Provide a diagram to represent a single linked list that stores the following list of integers as the only data in the nodes.

[1 mark]

**b)** Provide a second diagram that illustrates how you would a new element, 17, to the list in the correct numerical order.

c) Now write a method called insertElement(data, position) that implements the algorithm you have outlined. You can assume that the ListClass uses inner classes for the node and implements iterators and also that the node class exists.