



EXAMINATIONS — 2007

TERMS TEST

COMP 205
Software Design and
Engineering

Time Allowed: 1 Hours

Instructions: There are 50 possible marks on the test.
Answer all questions in the boxes provided.
Every box requires an answer.
If additional space is required you may use a separate answer booklet.
Non-electronic Foreign language dictionaries are allowed.
Calculators ARE NOT ALLOWED.
No reference material is allowed.

	Topic	Marks	
1.	Modelling	22 marks	<input type="text"/>
2.	Designing	16 marks	<input type="text"/>
3.	Programming	12 marks	<input type="text"/>

Question 1. Modelling.

[22 marks]

(a) [2 marks] Carefully and neatly perform a textual analysis of the description below by underlining nouns.

In an auctioning system, goods are bought and sold between customers.

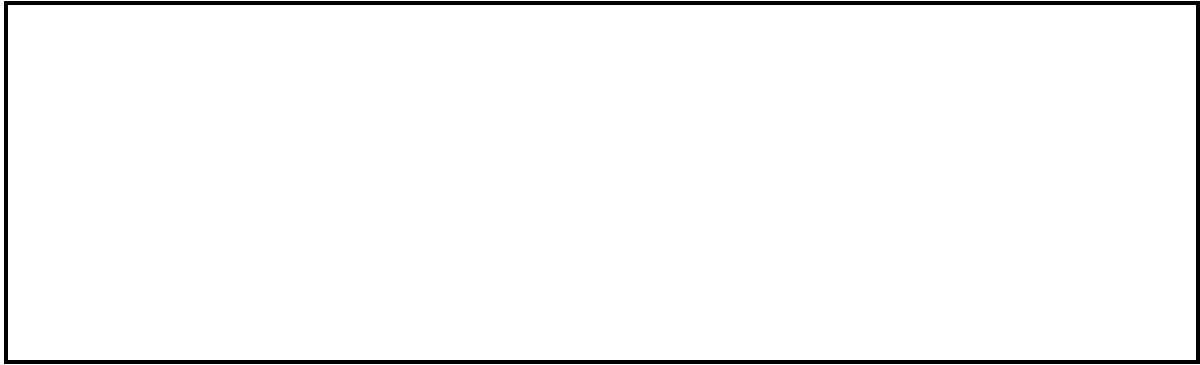
An auction consists of a seller, the potential buyers and the item(s) being auctioned. Everything for sale (e.g. furniture, CDs, books, etc) has a description and a photograph. A reserve price and end-date are also set for each auction. When the auction closes, the highest bid over the reserve price purchases the item(s).

Each customer has a postal address (which may or may not be verified) and an email address (to initiate contact between sellers and buyers). A customer may have many items for sale at any given moment, although each can only be sold in one auction at a time.

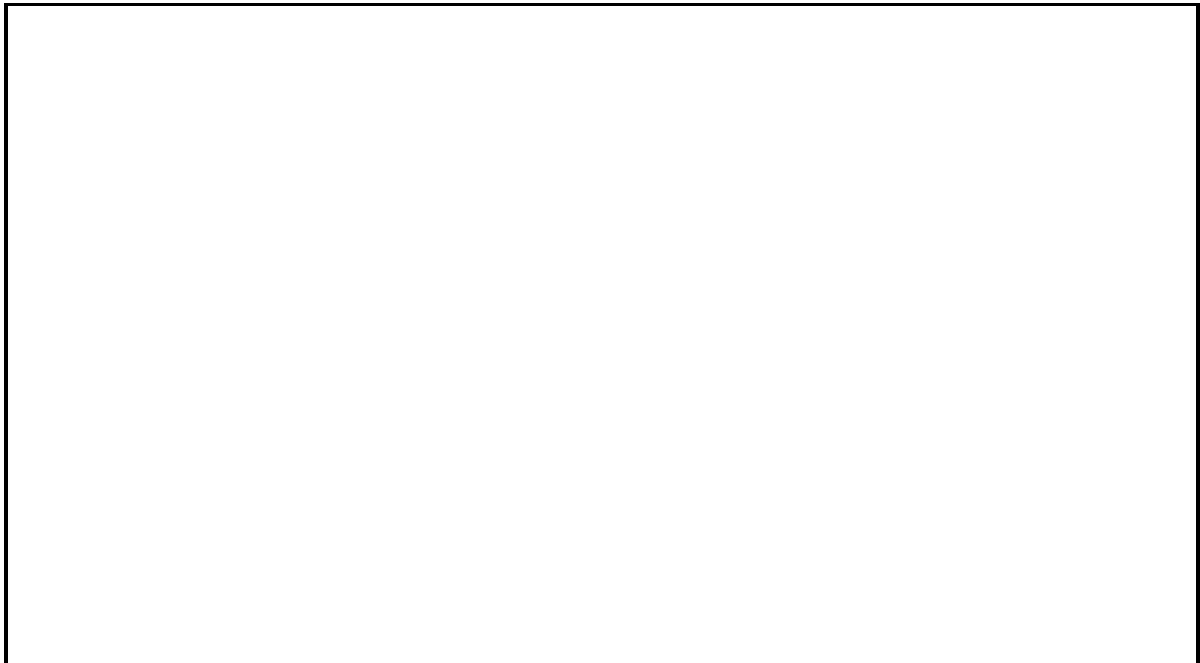
(b) [4 marks] From your textual analysis, identify the *candidate objects*. For each, identify any other nouns which represent the same thing.

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(c) [4 marks] From the description, identify the *candidate use cases*.



(d) [4 marks] Write an *Essential Use Case* card for one of your candidate use cases.

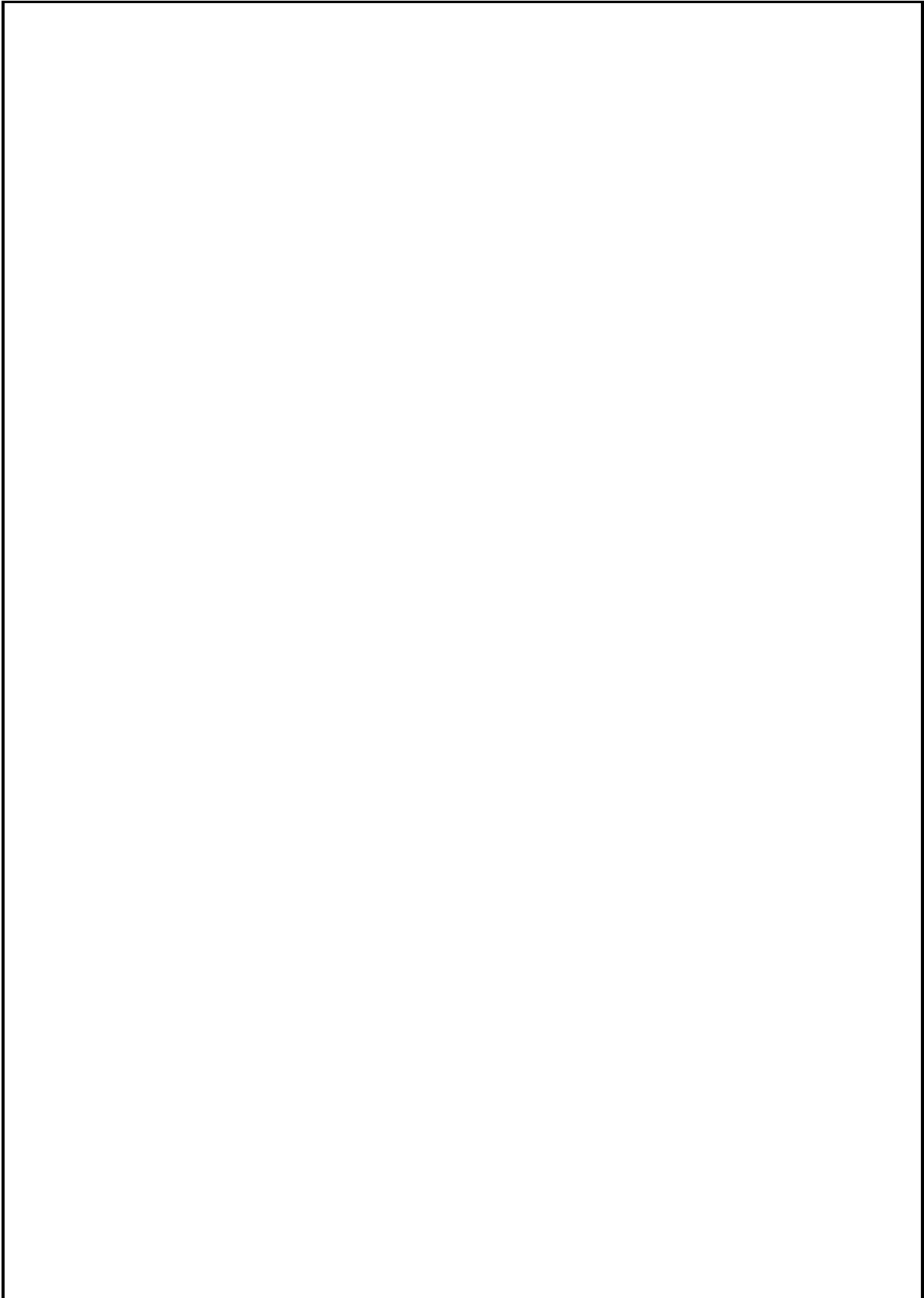


(e) [2 marks] Identify two issues with the description that require further clarification.



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(f) [6 marks] Draw a UML class diagram showing all the classes and their relationships that you would use to represent the auctioning system.

A large, empty rectangular box with a thin black border, intended for the student to draw a UML class diagram. The box is currently blank.

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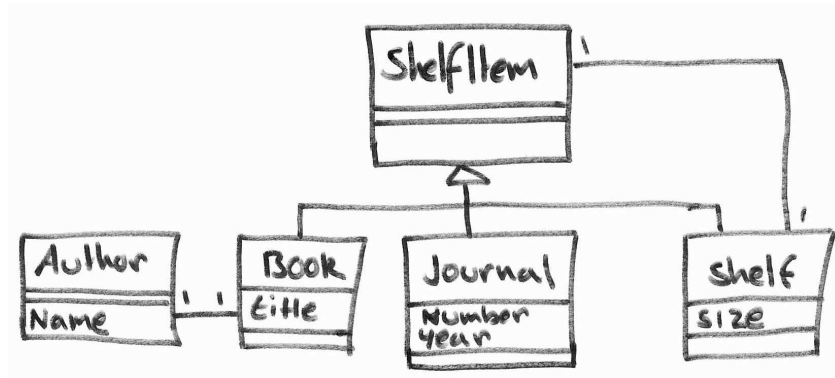
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Specify the question number for work that you do want marked.

Question 2. Designing.

[16 marks]

A system for organising books and journals is being developed. The system design is outlined in the UML class diagram given below. The Java implementation of this design is also given below.



```

abstract class ShelfObject {
    private Shelf shelf; // shelf item is on
    public int ISBN;
    public ShelfObject(int isbn) { shelf=null; ISBN=isbn; }
    public void setShelf(Shelf _shelf) { shelf=_shelf; }
    public Shelf getShelf() { return _shelf; }
}

class Book extends ShelfObject {
    private String title;
    public String getTitle() { return title; }
    public Book(String _title, int isbn) {
        super(isbn); title = _title; author = _author;
    }
}

class Journal extends Book {
    public int edition, year;
    public Journal(int ed, int year, int isbn) {
        super("",isbn); edition=ed; year=year;
    }
}

class Magazine extends ShelfObject {
    public String title;
    public int edition;
    public Magazine(String _title, int ed, int isbn) {
        super(isbn); title=_title; edition=ed;
    }
}

class Shelf {
    private List<ShelfObject> items = new ArrayList<ShelfObject>();
    public void addItem(ShelfObject i) { i.setShelf(this); items.add(i); }
    public Iterator iterator() { return items.iterator(); }
}
  
```

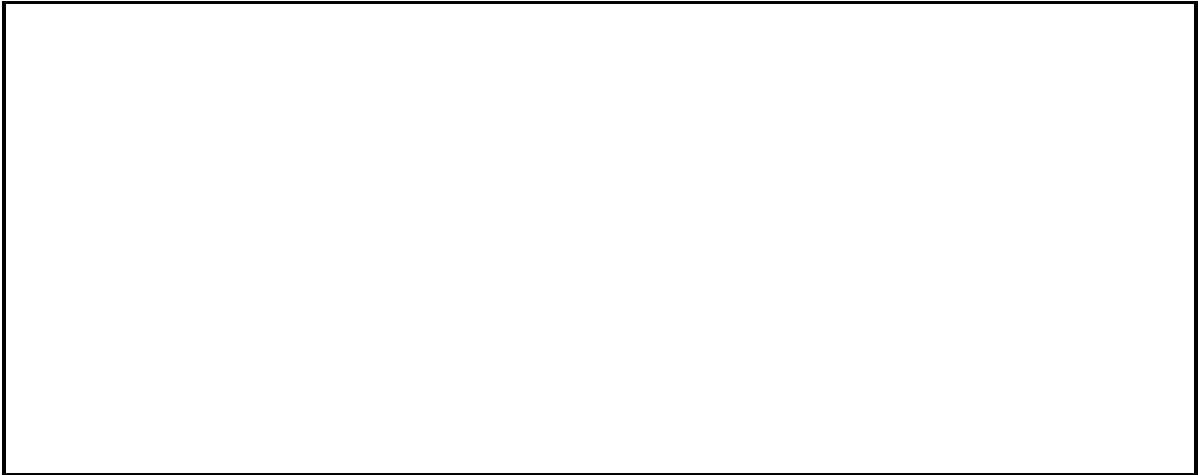
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(a) [12 marks] Unfortunately, there are several *inconsistencies* between the design and implementation.

Identify six important differences between the UML design and the Java implementation. For each, give a one or two line description in the answer boxes below.

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(b) [4 marks] Consider the UML class diagram. Do you think it was sensible to have “Author” as a separate class, rather having it as a field of Book? Briefly, justify your answer.



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Question 3. Programming.

[12 marks]

Consider the following Java code, which implements a (very) simple collections library:

```
public interface MyCollection<T> {
    public void add(T elem);
    public void remove(T elem);
    public T get(int idx);
    public int length();

    public String toString() {
        String r = "";
        for(int i=0;i!=length();++i) {
            r += " " + get(i).toString();
        }
        return r;
    }
}

public class MyVector<T> implements MyCollection<T> {
    private Object[] elems;
    private int last;

    public MyVector(int max) { elems = new Object[max]; last = 0; }

    public void add(T elem, int count) {
        while(count > 0) { elems[last++] = elem; }
    }
    public void remove(T elem) {
        for(int i=0;i!=last;++i) {
            if(elems[i] = elem) { elems[i] = null; }
        }
    }

    public T get(Integer idx) { return elems[idx]; }
    public int length() { return new int(last); }
}

public class Test {
    public static void print(MyVector<Object> vec) {
        System.out.println("TEST VECTOR: " + vec.toString());
    }

    public static void main(String args[]) {
        MyVector<String> myVec = new MyVector<String>();
        myVec.add("Test 1");
        myVec.add("Test 2");
        print(myVec);
    }
}
```

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(a) [12 marks] Unfortunately, the Java code on the previous page does not compile.

- Circle six different errors in the code which prevent it from compiling.
- For each of these six errors, write one or two lines describing the error and why it is a problem.

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Cross out rough working that you do not want marked.
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