1. Consider the following brief description of the (much simplified) process of trial by jury in a criminal case.

> The prosecution lawyer presents the case for the crown. The defence lawyers present the defence. Each lawyer challenges the presentation of each other's case. The judge controls proceedings to see they are lawful. After the presentation of the case for and against the defendant the judge sums up and asks the jury to deliberate. Having deliberated the jury deliver the verdict and if necessary the judge sentences the defendant.

(a) Describe how you would go about capturing the requirements in this short description in UML notation. Describe any diagrams you use in representing this system. *9 Marks*

(b) What diagram would you suggest using to represent the activities in this system. Justify your choice. Use your choice of diagram to describe the activities of the system in UML. *8 Marks*

(c) Write short notes identifying what you consider to be the two principal strengths of Object Oriented Design and give two weaknesses you consider to be important. In all cases you should justify your answers. *8 Marks*

2. Consider the following informal description of one aspect of Inland Revenue.

> *The Inland Revenue is responsible for maintaining tax records on most UK citizens. Each year people living in the UK must send in a tax form. This estimates the level of tax an individual must pay in a year. The Revenue checks this amount, decides if a change of tax code is necessary and informs individuals of changes in tax code. This involves checking the form is completed correctly.*

(a) Construct a preliminary class diagram for this system using some systematic method you are familiar with. Take care to describe *how* you derived the diagram. *10 Marks*

(b) How would you go about checking your preliminary class diagram is correct? *5 Marks*

(c) Use this method to check your class diagram, explain how you have done this. *5 Marks*

(d) Sketch the methods you believe each class should have by naming them and giving their type and a brief description of what they do.

3. Consider the following use cases for a simple library system:

Borrow Book: The library user initiates this by bringing the book to the librarian. The librarian records that the book is on loan and returns it to the user.

Return Book: The library user initiates this by giving the book to the librarian who records that the book has been returned and puts it in a bin to await being returned to the stacks.

Issuing fines: The librarian initiates this when a book is overdue for return. The librarian sends a recall letter to the library user demanding the return of the book and the payment of a fine.

(a) Construct a class diagram derived from these use cases. *5 Marks*

(b) Construct 2 or more sequence or collaboration diagrams that capture sequences of event in the system. *6 Marks*

(c) Describe how you might use your sequence or collaboration diagrams to validate the class model. *5 Marks*

(d) On the basis of your work so far develop the class diagram to include methods and attributes. *5 Marks*

(e) *Sequence and collaboration diagrams provide identical information.* Present short notes summarising the arguments for and against this statement. *4 Marks*