Name: ___________________________        Student Number: ____________

1. Draw the UML diagram (showing all fields, methods, etc.) for the following code. Assume there are no syntax errors and the classes are well defined [5 pts]:

```java
public class Person
{
    private String name;
    private int age;
    protected void changeAge(int theAge)
    {
        ...}
    public void play() { ...}
    private Brain theBrain = new Brain();
    private Hear theHeart;
    public transplant(Heart another)
    {
        theHeart = another;
    }
}
```

2. (a) What are the benefits of encapsulation? [5 pts]

(b) Would you consider the following code to be well encapsulation? Explain. [5 pts]

```java
class Inventory
{
    private Vector books = new Vector();
    public Vector getBooks() { return books; }
    public void addBook(Book aBook) { books.addElement(aBook); }
}
```
3. What is the difference between Association, Aggregation and Composition [5 pts]

4. Give an example when you would choose to model using inheritance rather than aggregation and give an example when you would choose aggregation over inheritance [5 pts]

5. Draw a UML diagram showing the following: A company employs one or more persons. A person works for zero or more companies. Salary is an attribute that represents the compensation that a company pays for a person employed by that company. [5 pts]
6. (a) What is the main purpose of use case model? [4 pts]

(b) How does it get used during the software development process? [4 pts]

7. Given the following problem statement, draw a use case diagram showing actors and use cases and their relationships [5 pts]:
   A Bank wants you to build a software system for an ATM which will be connected through a network. A Customer will approach the atm and insert the bank ATM card and enter the pin number. The customer will then be allowed to choose among the accounts that the customer has by displaying the account number and type of the account. Once the customer chooses an account, he/she may check the balance on the account and request for a printed copy (receipt). The customer may also withdraw cash, not exceeding the amount of $200 per day. Customer may also transfer funds between his/her own accounts. A banker may connect remotely to the ATM and get reports on daily transactions, like the accounts processed, amount dispensed, cash left on the machine, etc. An operator may access the ATM to add money and fill in printer paper at any time.
8. For the above problem, write the flow of events (base and alternative) for two important use cases [7 pts]