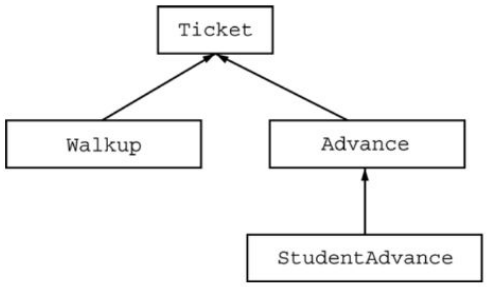
# 2005 #2 FRQ

2005 AP®
COMPUTER SCIENCE A FREE-RESPONSE QUESTIONS


2. A set of classes is used to handle the different ticket types for a theater. The class hierarchy is shown in the following diagram.




All tickets have a serial number and a price. The class Ticket is specified as an abstract class as shown in the following declaration.

```
public abstract class Ticket

{
        private int serialNumber; // unique ticket id number

        public Ticket()

        { serialNumber = getNextSerialNumber(); }

        // returns the price for this ticket

        public abstract double getPrice();

        // returns a string with information about the ticket

        public String toString()

        {
                return "Number: " + serialNumber + "\nPrice: " + getPrice();

        }

        // returns a new unique serial number

        private static int getNextSerialNumber()

        { /* implementation not shown */ }

}
```

Each ticket has a unique serial number that is assigned when the ticket is constructed. For all ticket classes, the toString method returns a string containing the information for that ticket. Three additional classes are used to represent the different types of tickets and are described in the table below.

| Class | Description | Sample `toString` Output |
|---|---|---|
| `Walkup` | These tickets are purchased on the day of the event and cost 50 dollars. | `Number: 712`<br>`Price: 50` |
| `Advance` | Tickets purchased ten or more days in advance cost 30 dollars. Tickets purchased fewer than ten days in advance cost 40 dollars. | `Number: 357`<br>`Price: 40` |
| `StudentAdvance` | These tickets are a type of `Advance` ticket that costs half of what that `Advance` ticket would normally cost. | `Number: 134`<br>`Price: 15`<br>`(student ID required)` |

Using the class hierarchy and specifications given above, you will write complete class declarations for the Advance and StudentAdvance classes.

(a) Write the complete class declaration for the class Advance. Include all necessary instance variables and implementations of its constructor and method(s). The constructor should take a parameter that indicates the number of days in advance that this ticket is being purchased. Tickets purchased ten or more days in advance cost $30; tickets purchased nine or fewer days in advance cost $40.

(b) Write the complete class declaration for the class StudentAdvance. Include all necessary instance variables and implementations of its constructor and method(s). The constructor should take a parameter that indicates the number of days in advance that this ticket is being purchased. The toString method should include a notation that a student ID is required for this ticket. A StudentAdvance ticket costs half of what that Advance ticket would normally cost. If the pricing scheme for Advance tickets changes, the StudentAdvance price should continue to be computed correctly with no code modifications to the StudentAdvance class.