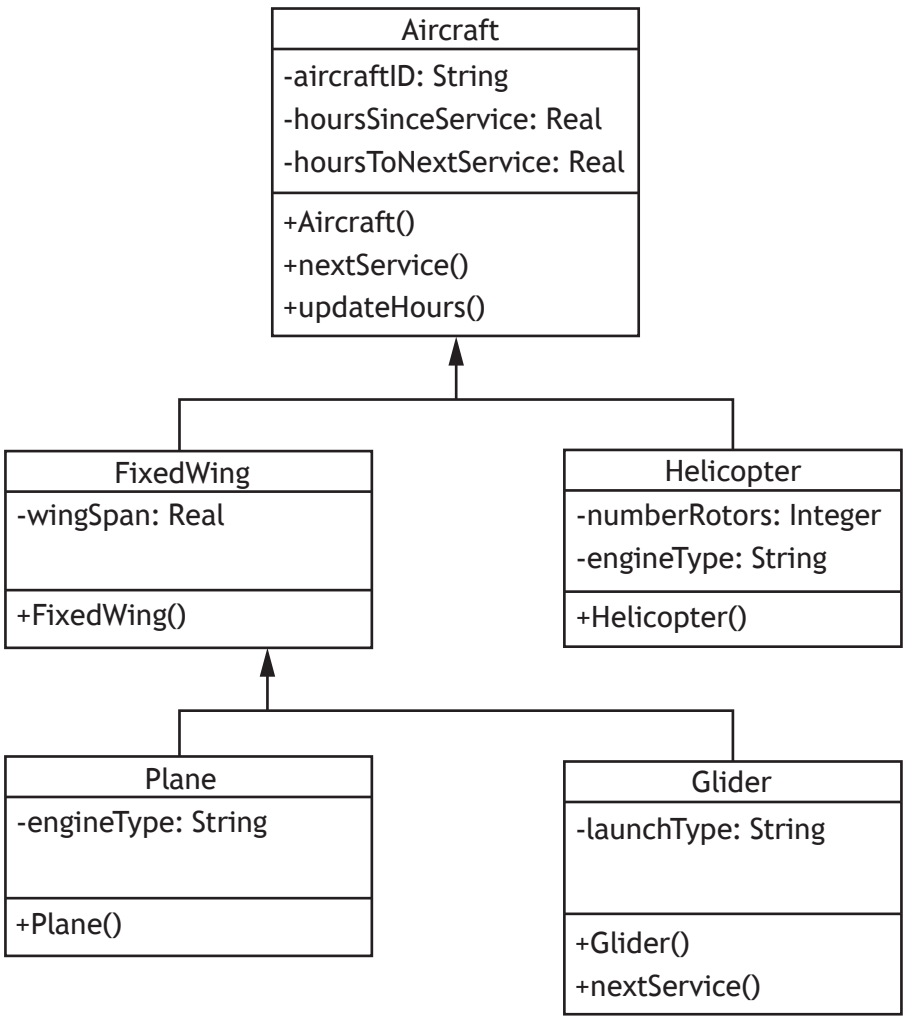
4. An object-oriented program is written to store and process aircraft details. Different types of aircraft include fixed wing planes, helicopters and gliders. Fixed wing planes and helicopters are serviced every 100 flight hours whereas gliders are serviced every 250 flight hours.

A simplified version of the UML class diagram for the program is shown below.



(a) Describe how inheritance affects the `Plane` class. **2**

(b) Initial values may be set using a constructor method.

(i) Name the constructor method for either of the superclasses shown on the UML class diagram. **1**

(ii) The first line of code in the class declaration for the `Aircraft` class is provided below.

```
CLASS Aircraft IS { STRING aircraftID, REAL
hoursSinceService, REAL hoursToNextService }
```

Using a programming language of your choice, write the equivalent code for the `Helicopter` class. **2**

4. (continued)

(c) The `nextService()` methods of the `Aircraft` and `Glider` classes are shown below.

Aircraft class

```
FUNCTION nextService () RETURNS REAL
   SET THIS.hoursToNextService = 100 - THIS.hoursSinceService
   RETURN THIS.hoursToNextService
END FUNCTION
```

Glider class

```
OVERRIDE FUNCTION nextService () RETURNS REAL
   SET THIS.hoursToNextService = 250 - THIS.hoursSinceService
   RETURN THIS.hoursToNextService
END FUNCTION
```

Using appropriate object-oriented terminology, explain the use made of the `OVERRIDE` statement in the `nextService()` method of the `Glider` class. **2**

(d) A program makes use of the classes in the UML class diagram. Some of the code from this program is shown below.

```
Line 54   DECLARE plane1 INITIALLY Plane ("ABC123", 0.0,
          100.0, 28.9, "jet")
...
...
Line 81   DECLARE fleet AS ARRAY OF Plane INITIALLY [NULL] * 76
Line 82   SET fleet[0] TO plane1
...
...
Line 93   DECLARE numberPlanes INITIALLY countServiceDue(fleet)
Line 94   SEND numberPlanes & " are due a service" TO DISPLAY
```

(i) Using appropriate object-oriented terminology, explain the purpose of Line 54 of this program. **2**

(ii) Using appropriate object-oriented terminology, explain the purpose of Line 81 and Line 82 of this program. **2**

(iii) The `countServiceDue()` function called at Line 93 is used to count the number of planes in the fleet that return a value of no more than 12 when the `nextService()` function is applied.

Using an object-oriented language of your choice, write the code for the `countServiceDue()` function. **3**