**Homework 1**

For problems 1 through 4, explain why the code as shown is almost certainly not what the programmer intended, and how it should be fixed to work the way the programmer probably had in mind.

1. (10 pts) What is wrong with the following program and how should it be fixed?

1  public class MyClassA {  
2    int v = 12;  
3   
4    public MyClassA (int pV) {  
5      v = pV;  
6    }   
7   
8    public static void main (String args []) {  
9      MyClassA m = new MyClassA ();  
10   } // end main  
11 } // end class MyClassA

The program above will have a compilation error because line 9 expects one argument in the parameters of MyClass A, but has 0. The problem is this program doesn’t have an empty parameter with the same name as the class. In order to circumvent this error, the programmer must add an empty constructor of the name *MyClassA*. Additionally, they could initialize v inside the default constructor and simply just declare v outside.

2. (10 pts) What is wrong with the following program and how should it be fixed?

1  public class MyClassB {  
2    int v = 12;  
3   
4    public void MyClassB (int pV) {  
5      v = pV;  
6    }   
7   
8    public static void main (String args []) {  
9      MyClassB m = new MyClassB (23);  
10   } // end main  
11 } // end class MyClassB

This program has no constructors. Line 4 must be a typo. What was meant to be a constructor ended up being typed as a void method. Remove the word “void”, so you will have only public MyClassB (int pV). Additionally, they could take in a default constructor that takes no arguments.

3. (10 pts) What is wrong with the following program and how should it be fixed?

1   public class MyClassD {  
2     public static void main (String args []) {  
3       MyClassC m = new MyClassC (23);  
4     } // end main  
5   } // end class MyClassD  
6   
7   class MyClassC {  
8     int v = 12;  
9   
10    public MyClassC (int pV) {  
11      int v = pV;  
12    }   
13   
14  } // end class MyClassC

The problem with this program is that they’re declaring a local variable v on line 11. So the actual instance variable v is not getting changed in the constructor. Thus, the way to fix this issue is to remove the “int” from line 11.

4. (10 pts) What is wrong with the following program and how should it be fixed?

1   public class MyClassE {  
2     public static void main (String args []) {  
3       MyClassF m = new MyClassF (23);  
4     } // end main  
5   } // end class MyClassE  
6   
7   class MyClassF {  
8     int v = 12;  
9   
10    private MyClassF (int pV) {  
11      v = pV;  
12    }   
13   
14  } // end class MyClassF

The issue is the constructor on line 10 is private instead of public. The fix would be to make it public.

5. (10 pts) Given all the problems identified in problems 1 through 4, explain in detail why the following code works, ie, compiles without errors or warnings.

1  public class MyClassG {  
2    public static void main (String args []) {  
3      MyClassH m = new MyClassH (23, true);  
4    } // end main  
5  } // end class MyClassG  
6   
7  class MyClassH {  
8    int v = 12;  
9   
10   public MyClassH (int x, boolean b) {  
11     this (x);  
12   }   
13   
14   private MyClassH (int pV) {  
15     v = pV;  
16   }   
17   
18 } // end class MyClassH

This program works because the constructor is public and has both an int and Boolean argument, which is why line 3 works. Line 11 works because it’s calling the private constructor on line 14.

6. (10 pts) Explain why the following class hierarchy is not reasonable:

* DefenseDepartment
  + General
    - Private

This is unreasonable because the general and private are not related in any way to the defense department, so they should not be subclasses. Also, a private would not necessarily be a subclass of a general because a private is not a general whatsoever. A private and a general may possibly be subclasses of soldiers.

7. (10 pts) Give at least one example of a reasonable field for each of the following classes in the following class hierarchy. Be sure that the field is at the right level in the hierarchy.

* Vehicle – speed, weight, miles per hour, fueltype
  + Car – rearviewMirrorSize, rearviewMirrorType
  + Airplane – winglength
    - Passenger - bathrooms
    - Fighter – missileType
    - Bomber - bombWeight
  + SpaceShip – gravityLevel

8. (10 pts) Give at least one example of a reasonable method for each of the following classes in the following class hierarchy. Be sure that the method  is at the right level in the hierarchy. Constructors, getters and setters don't count for this problem.

* Vehicle – refuel method,
  + Car - honkHorn
  + Airplane – takeFlight,
    - Passenger – seatbeltLightOn, reclineChair
    - Fighter - fireMissile
    - Bomber - dropBob
  + SpaceShip – blastOff, detachRockets;

9. (10 pts) Are a Private and a Platoon in an encapsulation or an inheritance relationship? Explain

Private and Platoon would be considered encapsulation relationship because Private is not a kind of Platoon. Privates would be bundled up together within a Platoon Class.  
  
10. (10 pts) Present reasonable parent and child classes for the class Tree (the biological kind). Give a short explanation for why the classes you are proposing are in good parent-child relationships.

* Parent
  + Mother
  + Father
* Child
  + Son
  + Daughter

These are good because a parent and child aren’t really related would not need to share the same methods. Mother and Father would be subclasses of Parent so that they can have the generalized attributes of all parents in addition to the specific attributes to the mother or father. The same logic goes for having son and daughter subclasses of child.

**Grading Rubric:**

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Meets** | **Does not meet** |
| Problem 1 | **10 points** Explains why the code as shown is almost certainly not what the programmer intended.  Explains how it should be fixed to work the way the programmer probably had in mind. | **0 points** Does not explain why the code as shown is almost certainly not what the programmer intended.  Does not explain how it should be fixed to work the way the programmer probably had in mind. |
| Problem 2 | **10 points** Explains why the code as shown is almost certainly not what the programmer intended.  Explains how it should be fixed to work the way the programmer probably had in mind. | **0 points** Does not explain why the code as shown is almost certainly not what the programmer intended.  Does not explain how it should be fixed to work the way the programmer probably had in mind. |
| Problem 3 | **10 points** Explains why the code as shown is almost certainly not what the programmer intended.  Explains how it should be fixed to work the way the programmer probably had in mind. | **0 points** Does not explain why the code as shown is almost certainly not what the programmer intended.  Does not explain how it should be fixed to work the way the programmer probably had in mind. |
| Problem 4 | **10 points** Explains why the code as shown is almost certainly not what the programmer intended.  Explains how it should be fixed to work the way the programmer probably had in mind. | **0 points** Does not explain why the code as shown is almost certainly not what the programmer intended.  Does not explain how it should be fixed to work the way the programmer probably had in mind. |
| Problem 5 | **10 points** Given all the problems identified in problems 1 through 4, explains in detail why the code works, ie, compiles without errors or warnings. | **0 points** Given all the problems identified in problems 1 through 4, does not explain in detail why the code works, ie, compiles without errors or warnings. |
| Problem 6 | **10 points** Explains why the class hierarchy is not reasonable. | **0 points** Does not explain why the class hierarchy is not reasonable. |
| Problem 7 | **10 points** Gives at least one example of a reasonable field for each of the classes.  The field is at the right level in the hierarchy. | **0 points** Does not give at least one example of a reasonable field for each of the classes.  The field is not at the right level in the hierarchy. |
| Problem 8 | **10 points** Gives at least one example of a reasonable method for each of the classes.  The method is at the right level in the hierarchy.  Does not include constructors, getters and setters. | **0 points** Does not give at least one example of a reasonable method for each of the classes.  The method is not at the right level in the hierarchy.  Includes constructors, getters and setters. |
| Problem 9 | **10 points** Explains inheritance and encapsulation correctly and in sufficient detail given the example provided. | **0 points** Does not explain inheritance and encapsulation correctly and in sufficient detail given the example provided. |
| Problem 10 | **10 points** Presents reasonable parent and child classes for the class Tree.  Gives a short explanation for why the classes you are proposing are in good parent-child relationships. | **0 points** Does not present reasonable parent and child classes for the class Tree.  Does not give a short explanation for why the classes you are proposing are in good parent-child relationships. |