Vanier College
Computer Science Department

Programming 2

LAB 6

Q1: The following is some code designed by J. Hacker for a video game. There is an Alien class to represent a monster and an AlienPack class that represents a band of aliens and how much damage they can inflict:

```
class Alien

{
     public static final int SNAKE_ALIEN = 0;

     public static final int OGRE_ALIEN = 1;

     public static final int MARSHMALLOW_MAN_ALIEN = 2;

     public int type; // Stores one of the three above types

     public int health; // 0=dead, 100=full strength

     public String name;

     public Alien ( int type , int health, String name)

     {
          this.type = type;

          this.health = health;

          this.name = name;
     }
}

public class AlienPack

{
     private Alien[] aliens;

     public AlienPack (int numAliens)

     {
          aliens = new Alien[numAliens];

     }
```

```
    public void addAlien(Alien newAlien, int index)

    {
        aliens[index] = newAlien;
    }

    public Alien[] getAliens()

    {
        return aliens;
    }

    public int calculateDamage()

    {
        int damage = 0;
        for (int i=0; i < aliens.length; i++)
        {
            if (aliens[i].type==Alien.SNAKE_ALIEN)
            {
                damage +=10; // Snake does 10 damage
            }
            else if (aliens[i].type==Alien.OGRE_ALIEN)
            {
                damage +=6; // Ogre does 6 damage
            }
            else if (aliens[i].type== Alien.MARSHMALLOW_MAN_ALIEN)
            {
                damage +=1;
                // Marshmallow Man does 1 damage
            }
        }
        return damage;
    }
}
```

The code is not very object oriented and does not support information hiding in the Alien class. Rewrite the code so that inheritance is used to represent the different types of aliens instead of the “type” parameter. This should result in deletion of the “type” parameter. Also rewrite the Alien class to hide the instance variables and create a getDamage method for each derived class that returns the amount of damage the alien inflicts. Finally, rewrite the calculateDamage method to use getDamage and write a main method that tests the code.

Q2: Create a class called Vehicle that has the manufacturer's name (type String), number of cylinders in the engine (type int), and owner (type Person given next). Then, create a class called Truck that is derived from Vehicle and has the following additional properties: the load capacity in tons (type double since it may contain a fractional part) and towing capacity in pounds (type int). Be sure your class has a reasonable complement of constructors, accessor and mutator methods, and suitably defined *equals* and *toString* methods. Write a program to test all your methods.

The definition of the class Person follows. Completing the definitions of the methods is part of this programming project.

```
public class Person

{

     private String name;

     public Person()

     {...}

     public Person(String theName)

     {...}

     public Person(Person theObject)

     {...}

     public String getName()

     {...}

     public void setName(String theName)

     {...}

     public String toString()

     {...}

     public boolean equals(Object other)

     {...}

}
```