

## Lab 6

You are to begin with an abstract class called **Policeman** that might describe some of the policeman on a police force. The constructor contains the first name, last name, and years of service of an individual on the force.

```
import java.text.*;

public abstract class Policeman
{
    private String firstName;
    private String lastName;
    private int yearsOfService;

    DecimalFormat dos = new DecimalFormat("0.00");

    public Policeman(String first, String last,int y)
    {
        firstName = first;
        lastName = last;
        yearsOfService = y;
    }

    public String getFirstName()
    {
        return firstName;
    }

    public String getLastName()
    {
        return lastName;
    }

    public int getYearsOfService()
    {
        return yearsOfService;
    }

    public String toString()
    {
        return firstName +
            " " + lastName + "\n" +
            "years of service = " +yearsOfService;
    }

    public abstract double earnings();
    public abstract int benefitLevel();
}

// end    class Policeman
```

There will be three classes, Patrolman, the super class, Sergeant, which extends Patrolman, and Lieutenant, which extends Sergeant.

The two abstract methods, `earnings()` and `benefitLevel()`, will be

defined in the classes. The benefitLevel() method gives a measure of the benefits for each rank. It will start at 1 for a Patrolman, go up by 2 for a sergeant, and go up another 3 steps for a Lieutenant.

The start of the class Patrolman is:

```
public class Patrolman extends Policeman
{
    protected static double basePatrolPay = 3600;

    Patrolman(String first, String last, int y)
    {
        super(first,last,y);
    }

    public double getBasePatrolPay()
        :
    .
```

The base pay of a patrolman is \$3600 per month (all salaries are monthly salaries) The net take home pay of a patrolman is 85% of the base monthly pay + 6% of the (square root of the basePatrolPay) times the (number of years of service). His benefitLevel is 1

The start of the class Sergeant is

```
public class Sergeant extends Patrolman
{
    protected static double baseSgtPay = 4700;

    public Sergeant(String first, String last,int y)
    {
        super(first, last, y);
    }
}
```

As you see, the base pay of a sergeant is \$4700 a month. The net take home pay of a sergeant is 82% of the base pay + 1.2 times (the square root of the baseSgtPay) times the (number of years of service). His benefitLevel is two units higher than a patrolman's, and should be implemented by a "super" call.

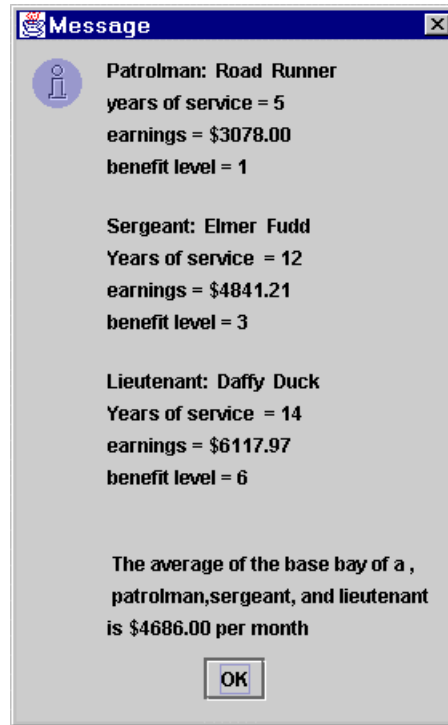
The start of the class Lieutenant is

```
public class Lieutenant extends Sergeant
{
    protected static double baseLieutenantPay = 5900;

    public Lieutenant(String first, String last,int y)
    {
        super(first, last, y);
    }
}
```

The net take home pay of a lieutenant is 80% of the baseLieutenantpay + 1.3 times the (square root of the baseLieutenantpay) times the (number of years of service). His benefitLEVEL IS 3 units higher than a sergeants and, again, should be implemented by a "super" call.

You are to test out your structure by writing an application called **TestPolice**. Its output will be:



Interesting roundoff error: When I computed the average above I took the sum of the three types of pay, and then multiplied by 0.33. This led to an error of about \$50.00 a month. If you take the sum of the three types of pay, and divide this total by 3 you get \$4733.33, which is the correct number.

This lab will be due Tuesday, Feb 20, at 5:30 pm