Computer Science 2311
Lab 11

Individual Activities

Note: Due to the confluence of my absence, the exam and the deadline for Homework 3, the late deadline for Lab 11 will be Thursday November 12 at 2:00 P.M.

Modify the program you wrote for Lab 9 to calculate the amount of interest that a person pays yearly on a loan, and to show the declining balance of the loan on an annual basis. An example of an ideal system interaction for analyzing a 15 year loan of $90000.00 at 6.75% interest would be the following (user's input is underlined to distinguish it from your program's output in this example)

```
Enter loan amount: 90000
Enter loan duration in years: 15
Enter interest rate as a percent: 6.75

** RESULTS **

For a 15 year loan of $90000.00 at 6.75% interest --

Monthly payment =     $      796.42
Total interest =      $   53355.33

Yearly balances

     Year          Interest        Loan Balance
        1           5965.23            86408.21
        2           5715.14            82566.33
        3           5447.64            78456.94
        4           5161.51            74061.43
        5           4855.46            69359.87
        6           4528.10            64330.94
        7           4177.95            58951.87
        8           3803.41            53198.26
        9           3402.80            47044.03
       10           2974.29            40461.31
       11           2515.95            33420.24
       12           2025.70            25888.91
       13           1501.31            17833.19
       14            940.40             9216.58
       15            340.45               -0.00
```

How to compute interest and declining balance

Mortgage loan payments are paid "in arrears." This means for example, that the payment you make on February 1 is for the interest you accrued during January. In performing the calculations for this problem, we will simplify and assume that the monthly rate is constant (i.e. is the yearly rate divided by 12). Thus, in the above loan, the interest paid the first month is (90000 * (.0675/12)) = $506.25. Since

the payment is 796.42, the balance at the end of the month (i.e. the amount still owed on the loan) = 90000 - (796.42 - 506.25) = 90000 - 290.17 = 89709.83

Thus, your first payment of 796.42 represents 506.25 in interest and 290.17 toward the loan balance. Therefore, the interest paid in the second month is based on the new balance and not the original 90000.

You must sum this up month by month over the year to get the totals in the second and third columns above. In general, if Balance represents the current amount owed on the loan, and MoRate represents the monthly interest rate, then the amount paid that month in interest (MonthInterest) = Balance * MoRate, and the new balance (NewBalance) = Balance - (MonthlyPayment - MonthInterest).

Please note the following important information about completing this program

- To help you in neatly formatting your output, you may assume that the loan amount is less than one million dollars, the loan duration is a whole number of years less than 100, and that the interest rate will be less than 100% and will have at most two decimal places in it as in the example above.

- As a reminder, when you use *System.out.printf*, you can specify a width specifier with any type of output, and furthermore, you can use it with the display of constants. Thus for example, *System.out.printf("%8s","Year")* will output the string *"Year"* (without the quotes) in a field of width 8. Since printf right justifies, the word will print in columns 5-8 of the field.

- Do not assume that what I have given you above is Java. It is mathematics. You must translate it into Java. The simplest thing to do is to add some logic to your *main* method after calculating the monthly payment and doing the initial output to generate the amortization table.

- Be sure the order of your output matches my sample.

- Your program will be evaluated on the basis of its correctness, the neatness and informativeness of its output and messages, and your adherence to the programming standards of this class.

- A solution to Lab 9 is available on the WWW if you need to start by modifying it rather than using your own solution to Lab 9. You are better off using your own if you have a working solution.

- Submission information: Name your file Lab11.java and place in a separate subdirectory with a name of your choice. Use the command *submit l11 Lab11.java* to electronically submit your assignment.

- This problem is worth 50 points. **A program that does not compile will receive zero points.**