CIS 255 • Java Programming
Project 2: Methods

The formula to determine the payment required each period for a loan is as follows:

$$\text{Payment} = P \times \left[r + \frac{r}{(1 + r)^n - 1} \right]$$

In this formula:

- P is the principal (the amount being borrowed)
- r is the periodic interest rate expressed in decimal form (e.g., 0.03 for 3%)
- n is the number of payment periods for the loan (note than n is the power to which the sum $(1 + r)$ is raised)

Write a program in which the user enters the principal, annual interest rate[1], and length of time (in months) for a loan (assume that the principal and interest rate could have a decimal point). The program should send these values to a **procedural** method that calculates and **returns** the monthly payment required to pay off the loan with the given principal, interest rate[2], and number of payments. The program should display the result returned by this method with commas as necessary and two digits after the decimal point. The program should allow the user to repeat this calculation using a loop (either sentinel-controlled or ask-before-iterating). The program may use either the console or dialog boxes (**but not both**).

Use the following data to test your program:

Principal (Borrowed)	Annual Interest Rate	Term (Months)
$10,000	1.99%	36
$10,000	1.99%	48
$160,000	3.25%	180
$160,000	3.75%	180
$160,000	4.25%	360

POINTS: 50

[1] Either instruct the user in the prompt to enter the interest rate in decimal form, or allow the user to enter the interest rate in percent form and divide the user's input by 100 to obtain the decimal form.

[2] Although the user is entering the annual interest rate, you will need to divide this value by 12 to determine the monthly interest rate. You may have the program perform this division prior to calling the method, or you can have the method itself perform the division as part of its calculations.

Example Run (assume the user enters the values in bold at the end of the prompts):

```
How much do you plan to borrow?  $10000
What will the annual interest rate be?  1.99
How long will the term be (in months)?  48

Your monthly payment for this loan will be $216.91

Another calculation?  Enter Y for yes:  Y

How much do you plan to borrow?  $160000
What will the annual interest rate be?  3.25
How long will the term be (in months)?  180

Your monthly payment for this loan will be $1,124.27

Another calculation?  Enter Y for yes:  N

Thanks for using this loan payment calculator!

Press any key to continue . . .
```

BONUS (10 points): Allow the user to specify a low-end value and a high-end value for the interest rate. Have the program display a table showing the monthly loan payment for each increment of 0.25% starting with the low-end value. Display the interest rate and the monthly payment amount in right-aligned columns within this table. **You must use the console if you want to attempt this bonus; do not use dialog boxes.**

No bonus credit will be given unless the standard requirements of the assignment are met! Make sure that you have the basic functionality working regardless of whether or not you are able to complete the bonus portion successfully!

Example Run with Bonus (assume the user enters the values in bold):

```
How much do you plan to borrow?  $140000
How long will the term be (in months)?  180
Enter a minimum annual interest rate:  2.75
Enter a maximum annual interest rate:  4.25

 Rate    Payment
------ -----------
 2.75%      950.07
 3.00%      966.81
 3.25%      983.74
 3.50%    1,000.84
 3.75%    1,018.11
 4.00%    1,035.56
 4.25%    1,053.19

Another payment table?  Enter Y for yes:  N

Thanks for using this loan payment calculator!

Press any key to continue . . .
```

Your code should include comments at the top listing your name, the course, the project number, and a brief description of the program. It should also include **at least three inline comments** in your code explaining what your code is doing at that given point.

The deadline is posted on Blackboard. **No late work will be accepted! The deadline will be strictly enforced by Blackboard!**

You must use the syntax and structures covered in the lectures and chapters covered thus far in the textbook unless you receive prior authorization from your instructor. **Any attempt to use syntax beyond the scope of the course may result in significantly reduced credit, even if your solution is fully functional.**

If you need assistance with your project code, e-mail your instructor **at least one day in advance** of the deadline. E-mail messages sent too close to the deadline may not receive a response in adequate time to make corrections to the project.

You may discuss general details of the project with your classmates, but **do not look at or borrow another student's project code!** In addition, **do not post the details of the project or ask for assistance with specifics of this project on any public discussion board, forum, or newsgroup!**