Quiz 2 Programming Exercise

Write a Java program that calculates the monthly mortgage payment for a home loan along with the total amount of interest paid over the life of the loan.

The program should be able to calculate monthly payments for multiple mortgages until the user enters a 0 for the loan amount to indicate that program can terminate.

To calculate a monthly payment, you will need to get the following information from the user:

1. The loan amount (integer value). Must be greater than 0 to be valid.
2. The annual interest rate (any positive real number). Must be greater than 0 to be valid. Value can be entered as 6.5 or 6, but you must then represent it as 0.065 or 0.06 in your code.
3. The term of the loan in years (integer value). Must be greater than 0 to be valid.

When pulling input from the user, you must validate if the input is valid. If the input is not valid, you must prompt the user until valid input is provided. Example: if the user enters -5.6 for the interest rate, you should keep prompting for an interest rate until a value greater than 0 is entered.

To calculate the monthly payment, use this formula:

$$P = \frac{\mathrm{L} * [\mathrm{C} * (1 + \mathrm{C})^N]}{[(1 + C)^N - 1]}$$

$$where:$$
$$L\ is\ the\ loan\ amount$$
$$C\ is\ MONTHLY\ interest\ rate$$
$$N\ is\ the\ loan\ term\ in\ MONTHS$$

Display the result of the calculation to the user with exactly 2 decimal places using an appropriate format specifier. When displaying dollar amounts use a field width of 8 and a precision of 2. When displaying interest rates use a field width of 4 and a

precision of 2. When displaying integer data (i.e. initial loan amount) use a field width of 8.

The following is a sample run of the application that we will verify your code against. Your code should match the outputs exactly.

You should look at the program output before you start coding, as this will help you to make sure you understand the nuances of the application before starting your work.

Important Notes about Inputs:

1. When the user enters an interest rate, it is an ANNUAL interest rate of the form 6.5 to represent 6.5%. Interest are percentages, so in your variable, you should use 6.5/100 or 0.065 as the annual interest rate.
2. The mortgage payment calculation requires a MONTHLY interest rate. If the annual interest rate is 0.065, then the MONTHLY interest rate is 0.065 / 12 or 0.0054166666666667.

Sample Run Notes:

1. Make sure you run the sample run exactly with the numbers demonstrated below. This will be the only way for me to validate that the output is correct. If you use different numbers, I will mark it as incorrect even if the output may be correct for your use case.

Sample Run:

```
Please enter a positive integer for the loan amount: 100000
Please enter a positive number for the annual interest rate: 6.75
Please enter a positive integer for the term in years: 30

For a loan with these characteristics:
      $  100000
      6.75 annual interest rate
      30 year term

The Monthly Payment = $  648.60
The Total Amount Paid = $233495.31
The Total Interest Paid = $133495.31


Please enter a positive integer for the loan amount: -5
RETRY: Please enter a positive integer for the loan amount: -10
RETRY: Please enter a positive integer for the loan amount: 500000
Please enter a positive number for the annual interest rate: -6
RETRY: Please enter a positive number for the annual interest rate: -4
RETRY: Please enter a positive number for the annual interest rate: 6
Please enter a positive integer for the term in years: -4
RETRY: Please enter a positive integer for the term in years: -3
RETRY: Please enter a positive integer for the term in years: 40

For a loan with these characteristics:
      $  500000
      6.00 annual interest rate
      40 year term

The Monthly Payment = $ 2751.07
The Total Amount Paid = $1320512.74
The Total Interest Paid = $820512.74


Please enter a positive integer for the loan amount: 540000
Please enter a positive number for the annual interest rate: 3.85
Please enter a positive integer for the term in years: 30

For a loan with these characteristics:
      $  540000
      3.85 annual interest rate
      30 year term

The Monthly Payment = $ 2531.56
The Total Amount Paid = $911363.20
The Total Interest Paid = $371363.20


Please enter a positive integer for the loan amount: 0
THANK YOU FOR USING THE MORTGAGE CALCULATOR!!
```