**台州学院**

**电子与信息工程学院课后作业**

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Week6 Methods

**Project: Computing Future Investment Value**

Problem Description:

Write a method that computes future investment value at a given interest rate for a specified number of years. The future investment is determined using the following formula:

futureInvestmentValue =

investmentAmount x (1 + monthlyInterestRate)numberOfYears\*12

Use the following method header:

**public static double** futureInvestmentValue(

**double** investmentAmount, **double** monthlyInterestRate, **int** years)

For example, futureInvestmentValue(10000, 0.05/12, 5) returns 12833.59.

Write a test program that prompts the user to enter the investment amount (e.g., 1000) and the interest rate (e.g., 9%) and prints a table that displays future value for the years from 1 to 30, as shown below:

The amount invested: 1000

Annual interest rate: 9%

Years Future Value

1 1093.80

2 1196.41

...

29 13467.25

30 14730.57

Analysis:

The problem requires us to compute the future investment value based on an initial investment amount, an annual interest rate, and the number of years. The formula provided is:

futureInvestmentValue = investmentAmount \* (1 + monthlyInterestRate)^(years \* 12)

Where:

investmentAmount is the principal amount invested.

monthlyInterestRate is calculated as annualInterestRate / 12 / 100.

years is the duration in years for which the investment grows.

We need to:

1. Get user input for the investment amount and annual interest rate.

2. Compute and display the future investment value for each year from 1 to 30 in a table format.

Design:

1. Prompt user input:

* Read the investment amount.
* Read the annual interest rate.

2. Convert the interest rate:

1. Convert the annual interest rate to a monthly interest rate by dividing by 12 and converting it to decimal form.

3. Loop through years 1 to 30:

1. Use the formula to compute the future investment value for each year.
2. Print results in a formatted table.

Coding:

import java.util.Scanner;

public class Exercise06\_07 {

// method to calculate future investment value

public static double futureInvestmentValue(double investmentAmount, double monthlyInterestRate, int years) {

return investmentAmount \* Math.pow(1 + monthlyInterestRate, years \* 12);

}

public static void main(String[] args) {

Scanner input = new Scanner(System.in);

// prompt user for input

System.out.print("Enter investment amount: ");

double investmentAmount = input.nextDouble();

System.out.print("Enter annual interest rate (in percentage): ");

double annualInterestRate = input.nextDouble();

// convert annual interest rate to monthly interest rate

double monthlyInterestRate = annualInterestRate / 12 / 100;

// display table header

System.out.printf("%-5s %15s%n", "Years", "Future Value");

// compute and display future values for years 1 to 30

for (int year = 1; year <= 30; year++) {

double futureValue = futureInvestmentValue(investmentAmount, monthlyInterestRate, year);

System.out.printf("%-5d %15.2f%n", year, futureValue);

}

input.close();

}

}

Testing:

1. Test Case 1:

* Input: Investment Amount = 1000, Annual Interest Rate = 9%
* Expected Output:

Years Future Value

1 1093.80

2 1196.41

...

29 13467.25

30 14730.57

2. Test Case 2:

* Input: Investment Amount = 5000, Annual Interest Rate = 5%
* Expected Output: Values computed accordingly for 1-30 years.

3. Edge Cases:

* Zero Interest Rate: Should return the same investment amount for all years.
* Very High Interest Rate (e.g., 100%): Should exponentially increase over time.
* Negative Interest Rate: Should result in decreasing values over time.