CSC 15: Project 1

This project includes materials from both Chapters 1 and 2.

Problem

Write a program that analyzes savings returns for a given initial investment deposit amount and a savings rate. The bank offers a choice of 5 blocks. A five year, ten year, fifteen year, twenty year, and twenty five year block. Let's call these 5YB, 10YB, 15YB, 20YB and 25YB.

For blocks 10YB-25YB, the bank adds hidden administration costs into their savings rate calculation. The bank also adds a bonus amount to the initial deposit for blocks 10YB-25YB. This amount again increases proportionately with the time duration of the block selected. Once the block is selected and contract signed, the user is committed to the bank and may incur penalties for breaking contract.

The user of your program therefore depends on you to calculate and display the savings returns for each block, to be able to decide which is the most profitable block that he or she can lock their money into. Your program must also create a histogram to make this decision visual and easy.

The program should perform calculation on three different values of initial investment. The three values of initial investment are $3000, $4000 and $5000.

This assignment will require use of nested for loops, use of class constants, string, integer and double variables, and formatted *printf* statements. In addition, you will be expected to practice use of accumulators in loops to produce final results. Examine values given to you in the problem specification top help with calculations to set up loops.

Your program must exactly reproduce the behavior demonstrated below

Your output should look like this:

```
---------------SAVINGS CALCULATOR-------------
Initial Deposit: $3000.00 Initial Rate: 45.25%
--------------------------------------------

 5 Years:  13353.21 *
10 Years:  56449.75 *****
15 Years: 160345.57 ****************
20 Years: 355542.90 ***********************************
25 Years: 668138.49 ********************************************************************

---------------SAVINGS CALCULATOR-------------
Initial Deposit: $4000.00 Initial Rate: 45.25%
--------------------------------------------

 5 Years:  17804.29 *
10 Years:  72578.25 *******
15 Years: 200431.96 ********************
20 Years: 434552.44 *******************************************
25 Years: 801766.19 ********************************************************************************

---------------SAVINGS CALCULATOR-------------
Initial Deposit: $5000.00 Initial Rate: 45.25%
--------------------------------------------

 5 Years:  22255.36 **
10 Years:  88706.75 ********
15 Years: 240518.35 ************************
20 Years: 513561.97 **************************************************
25 Years: 935393.89 ****************************************************************************************************
```

Procedure and Formula

The general formula for each block is:

Savings for current year = savings from previous year + (saving from previous year * savings rate for this block)

This formula should be iterated for the given time period. For example, for 5YB (five year block) this calculation is done five times. The initial investment amount and initial savings rate is used to kick start the calculation. The savings for five years is the final value of the current savings.

So for the five year block your iteration will be as follows:

Savings for the first year = initial deposit + (initial investment* savings rate for 5YB)

Savings for the fifth year = savings for the fourth year + (savings for the fourth year*savings rate for 5YB)

The savings for the five year block are the savings calculated for the fifth year.

For blocks 10YB-25YB, a bonus is added to the initial deposit. This amount increases with size of block. Here is how it is calculated: Bonus for 5YB = 0. Bonus for 10YB = 500. Bonus for other blocks is 500 greater than the preceding block.

The savings rate is adjusted to take care of administrative costs: For example, savings for the 10YB will have the following logic

Savings for first year = (initial deposit + bonus_for_10YB)

+ (initial deposit + bonus-for_10YB)*savings rate for 10YB

Savings for the tenth year = savings for the ninth year

+ (savings for the ninth year)* savings rate for the 10YB

Note that the bonus addition starts at the 10YB at a value of $500. It is doubled for 15 year, tripled for 20 years and quadrupled for 25 years.

Due to administration costs for managing the account over long periods, the bank adds a hidden fee.

```
Rate decrement = 0.25 // class constant
Initial savings rate = 0.4525;    // class constant
```

Savings rate = savings rate/(1 + i*rate_decrement)

The variable i stands for the block number and ranges from 0 to 4

The savings rate calculation looks complicated! (like all bank calculations). So here is an example of how the savings rate calculation would take place for the 20YB using the formula given above. Notice that i = 3 for the 20YB.

Saving rate for 20YB = 0.4525/(1 +3*0.25)
= 0.425/(1+0.75)
= 0.4525/1.75
= 0.2586

You may use this table as a guide for when the interest is 45.25%. Please make sure to use class constants though, you will be graded on your program's ability to adjust when the constants are changed.

Type of Account	Interest Rate with Admin Costs	Bonus
5YB	45.25%	$0
10YB	36.20%	$500
15YB	30.17%	$1,000
20YB	25.86%	$1,500
25YB	22.63%	$2,000

Requirements

Use static methods to eliminate redundant code as much as possible and to break the problem up into logical subtasks. Your methods should be in a file called *SavingsCalculator.java* and be short enough to ensure visibility of the overall structure of the program. Introduce static methods as necessary to break this problem up into smaller subtasks. Your main method should be in a file called *SavingsCalculatorMain.java* and contain one single method call *savingsCalculate*.

Recommendation: Do not try to write the program in one go. Start with calculation for one initial deposit value and one five year block. Test your program and compare your output to the one given here. One example of prinf statement is:

```
System.out.printf("%20s","Twenty Five Years: "); // prints the string "Twenty Five Years" in 20 spaces
System.out.printf("$%.2f\n", currSavings);// prints the decimal number with 2 decimal places, and precedes it with a dollar sign.
```

Submission

Upload your completed work on the Canvas submission page. You should be uploading two java files, *SavingsCalculator.java* and *SavingsCalculatorMain.java*