CS603 Programming Assignment 2

Due by 4:30 PM on Tuesday 9/26

1. Getting Started

For this assignment, you will be writing a program that calculates college costs for a two- or four-year public (in-state or out-of-state) college. The problem description has been broken down into two sets of requirements, with the first requiring only if statements and the second requiring looping structures. After getting input from the user and calculating the cost of one year of college based on those inputs, verify that all of the paths through your code are functioning properly. Then add functionality to your existing code for verifying valid input data. Please read through the entire assignment before starting.

Be sure to follow both the general and the style requirements outlined in the first assignment. In addition, remember to remove any package statements added by Eclipse to your code and to create and use only one Scanner object if that is how you are getting input (note: do NOT create a Scanner object within a loop, as that will result in multiple objects!). When you are satisfied your code meets all requirements, submit **one** .java file via the Blackboard link for this assignment.

Warning: this assignment is significantly more complex than the first one. Be sure to get an early start!

2. Programming Assignment

Yearly Tuition (24 points)

The public university system of FiniteState offers several options to students. Those living in-district can attend a two-year program. Both in-state and out-of-state students can attend a four-year program, though the costs for out-of-state are considerably higher.

You will be calculating the current cost of one year of college based on the following values:

COLLEGE TYPE	TUITION AND FEES	ROOM AND BOARD	MINIMUM WEIGTHED GPA	MINIMUM SAT SCORE	MERIT AID
Two-year	3,826	6,850	*range: 1 - 10*	*400-1600*	
			9	1500	2,100
			8	1450	1,600
			7	1400	1,100
			6	1350	600
Four-year, in-state	14,307	13,495	*range: 4 - 20*	*400-1600*	
			18	1540	5,200
			15	1505	4,200
			12	1470	3,200
			9	1435	2,200
Four-year, out-of-state	30,885	13,495	*range: 4 - 20*	*400-1600*	
			18	1550	8,800
			14	1500	7,600
			10	1450	6,400

Table 1: Estimated Yearly Cost and Merit Aid (2017-2018)

Note the following:

- The university system calculates a weighted average for each applicant. The formula is different for the two-year program than for the four-year programs, so the range of valid GPAs is different. In- and out-of-state four-year programs use the same calculation, so the range is the same.
- The amount of merit aid differs for each of the three options and is based on meeting **both** the weighted GPA and SAT criteria. For example, an applicant to a four-year in-state program with a GPA of 18 and an SAT score of 1475 would receive $3,200 in merit aid (meets GPA of 12 or above, SAT of 1470 or above). An applicant to the same program with a GPA of 10 and an SAT score of 1600 would receive $2,200 in aid (meets GPA of 9 or above, SAT of 1435 or above).

Basic requirements:

- You will be prompting the user to enter the following information in the following order:
  - The number of years for the program (2 or 4) (as a whole number).
  - In-state (1) or out-of-state (2) (as a whole number). Note: ONLY include this prompt for four-year programs.
  - Tuition and fees only (1) or full cost (2), which includes room and board (as a whole number)
  - Weighted GPA (as a whole number)
  - Combined SAT score (as a whole number)
- Given the user's inputs, your program must determine and output:
  (1) The total cost before merit aid
  (2) The amount of merit aid, if any, that would be awarded to the applicant
  (3) The net cost after merit aid

  The above outputs must be formatted to 2 decimal places and include a dollar sign.
- You must use named constants for the Tuition and Fees and Room and Board values. Note that storing every valid GPA and SAT score combination along with the Merit Aid award would NOT be the best way to code this, as it would be very error-prone. Instead, look for high-level **patterns** in the data that will enable you to determine algorithmically the amount of merit aid awarded, if any.
- You will not receive full credit for overly repetitive logic. For example, a series of if statements covering every possible combination of GPA and SAT score for each program would not warrant full credit, as it would be very difficult to maintain if any requirement were to change and would also be very error-prone.

The following sample interactions show user inputs in boldface. Be sure to test thoroughly – do not rely on only the few examples included here.

Sample 1:

```
Enter 2 for two-year program or 4 for a four-year program: 2
Enter 1 for tuition and fees only or 2 for full cost: 1
Enter a weighted GPA between 1 and 10: 5
Enter a combined SAT score between 400 and 1600: 1500

Cost of 1 year of college: $3,826.00
Amount of merit aid: $0.00
Net cost: $3,826.00
```

Sample 2:

```
Enter 2 for two-year program or 4 for a four-year program: 4
Enter 1 for in-state or 2 for out-of-state: 2
Enter 1 for tuition and fees only or 2 for full cost: 2
Enter a weighted GPA between 4 and 20: 15
Enter a combined SAT score between 400 and 1600: 1475

Cost of 1 year of college: $44,380.00
Amount of merit aid: $6,400.00
Net cost: $37,980.00
```

Additional requirements:

Once you have the basic functionality working, add the following functionality to your existing code for verifying valid inputs according to the following:

- The length of the program must be 2 or 4.
- The value for in-state or out-of-state must be 1 or 2.
- The value for tuition only or full cost of must be 1 or 2.
- The GPA must be in the range shown for the corresponding program.
- The SAT must be between 400 and 1600, inclusive.

If any of the above conditions is not met, print an error message that includes the word "**invalid**" and re-prompt for that input before proceeding to the next input value, as shown below:

Sample interaction 3:

```
Enter 2 for two-year program or 4 for a four-year program: 5
Invalid number of years.
Enter 2 for two-year program or 4 for a four-year program: 1
Invalid number of years.
Enter 2 for two-year program or 4 for a four-year program: 4
Enter 1 for in-state or 2 for out-of-state: 3
Invalid value for program classification.
Enter 1 for in-state or 2 for out-of-state: 1
Enter 1 for tuition and fees only or 2 for full cost: 3
Invalid value for type of tuition.
Enter 1 for tuition and fees only or 2 for full cost: -1
Invalid value for type of tuition.
Enter 1 for tuition and fees only or 2 for full cost: 2
Enter a weighted GPA between 4 and 20: 3
Invalid GPA.
Enter a weighted GPA between 4 and 20: 10
Enter a combined SAT score between 400 and 1600: 1790
Invalid SAT score.
Enter a combined SAT score between 400 and 1600: 1500

Cost of 1 year of college: $27,802.00
Amount of merit aid: $2,200.00
Net cost: $25,602.00
```

3. Grading

Your program must compile and run to receive any credit. Points will be allocated as follows:

- 4 points for validating user inputs, printing error messages, and re-prompting, as necessary.
- 6 points for calculating and displaying correct costs in the required format for no merit aid cases.
- 12 points for calculating and displaying correct costs in the required format for merit aid cases.
- 2 points for style, including using named constants as specified in this assignment.