CS242: Advanced Programming Concepts in Java Programming Project: Simple Calculator

In this programming project, you will design and implement a simple GUI (Graphical User Interface) based calculator. This project has two parts: Part a and Part b.

You need to implement either Part a OR Part B.

Part B is a little complicated compared to Part a and you can try it for **5-point extra credit**.

Part a

For this part you need to implement a project that utilizes JavaFX functionalities to develop a simple calculator. As shown in figure 1, the calculator will have the following:

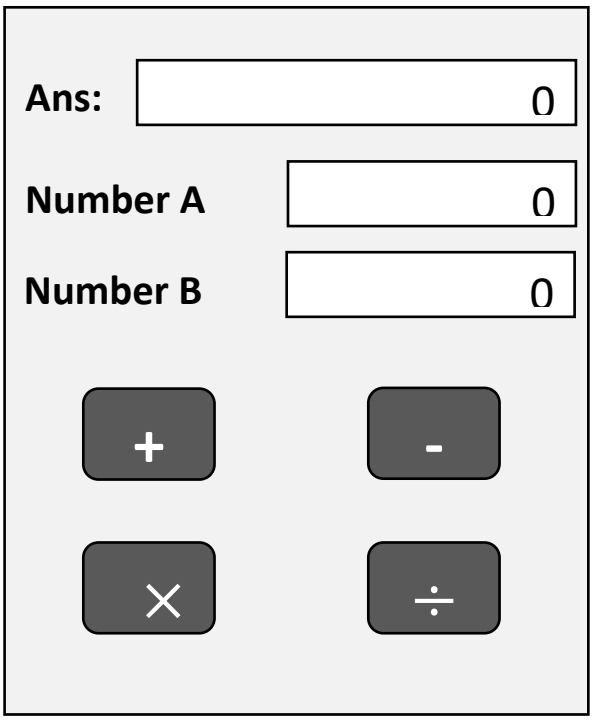

Figure 1

- Three labels: 'Ans:', 'Number A', and 'Number B'
- Three Textboxes next to the labels 'Ans:', 'Number A', and 'Number B'. From now on, textboxes will be referred by the labels next to it. For example, textbox next to label 'Ans:' will be referred as Ans: textbox.
- Four buttons: '+', '-', 'X', '÷'

The example layout in figure 1 is not designed using JavaFX. Therefore, it is OK if your layout looks a little different in style and arrangement. However, they should have all the components mentioned above and they should satisfy all the testcases defined below.

Test cases (Total grade 15):

1. When the project is executed, the calculator layout will load with all the mentioned components. **Grade 5**
2. The default value of the three text boxes will be zero. This should be displayed in the textboxes when the calculator is first displayed when you run the project. **Grade 1**
3. Textbox 'Ans:' will be not editable, while textbox 'Number A', and 'Number B' will be editable. **Grade 1**
4. When the button '+' will be clicked, the 'Ans:' textbox will show the answer of 'Number A' + 'Number B'. We will assume that 'Number A', and 'Number B' fields will always contain numbers and we do not need to check whether these fields contain numbers or not. **Grade 2**
5. When the button '-' will be clicked, the 'Ans:' textbox will show the answer of 'Number A' - 'Number B'. We will assume that 'Number A', and 'Number B' fields will always contain numbers and we do not need to check whether these fields contain numbers or not. **Grade 2**
6. When the button 'x' will be clicked, the 'Ans:' textbox will show the answer of 'Number A' x 'Number B'. We will assume that 'Number A', and 'Number B' fields will always contain numbers and we do not need to check whether these fields contain numbers or not. **Grade 2**
7. When the button '÷' will be clicked, the 'Ans:' textbox will show the answer of 'Number A' ÷ 'Number B'. We will assume that 'Number A', and 'Number B' fields will always contain numbers and we do not need to check whether these fields contain numbers or not. If 'Number B' textbox contains zero, in this case 'Ans:' textbox will show 'division by zero error' message. **Grade 2**

Part b (extra credit 5 points)

For this part is optional and students who need extra credit can work on this. If you choose to work on this, you do not need to implement the calculator in part a.

You need to implement a project that utilizes JavaFX functionalities to develop a simple calculator. As shown in figure 2, the calculator will have the following:

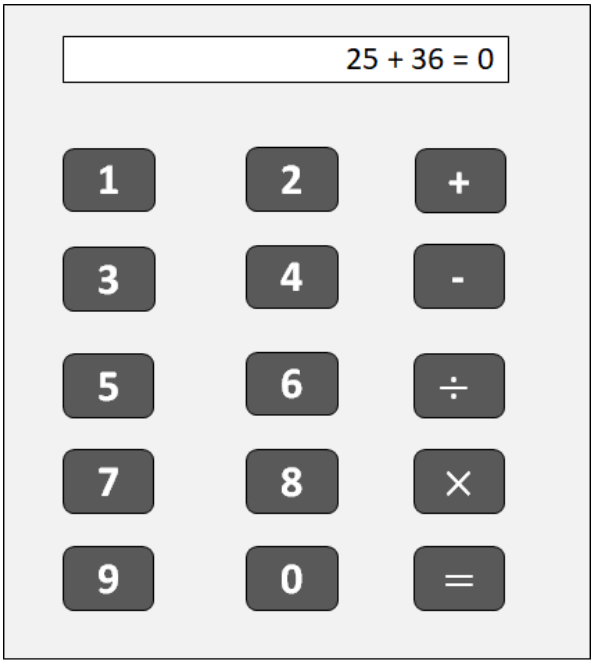

Figure 2

- A textbox
- All the buttons as shown in Figure 2.

The example layout in figure 1 is not designed using JavaFX. Therefore, it is OK if your layout looks a little different in style and arrangement. However, they should have all the components mentioned above and they should satisfy all the testcases defined below.

Test cases (Total grade 20):

1. When the project is executed, the calculator layout will load with all the mentioned components. **Grade 8**
2. The default value of the textbox will be zero. This should be displayed in the textbox when the calculator is first displayed when you run the project. **Grade 1**
3. When a button is clicked, the character corresponding to the button should be shown in the textbox. **Grade 3**

   Example:

If the buttons ‘1’, ‘5’, ‘-’, ‘5’ are clicked in the given order, the textbox will show ’15-5’
If the buttons ‘2’, ‘5’, ‘3’, ‘+’, ‘4’, ‘1’ are clicked in the given order, the textbox will show ’253+41’

4. Once the ‘=’ button is pressed the textbox should display the answer of the equation in the textbox. For this, we will assume that the textbox always contains a valid equation in the format <operand1> <operator> <operand2>. Where ‘operand1’ and ‘operand2’ are numbers, and operator can be ‘+’, ‘-’, ‘x’, or ‘÷’. **Grade 5**

   Example:
   If the buttons ‘1’, ‘5’, ‘-’, ‘5’, ‘=’ are clicked in the given order, the textbox will show ’15-5=10’
   If the buttons ‘2’, ‘5’, ‘3’, ‘+’, ‘4’, ‘1’, ‘=’ are clicked in the given order, the textbox will show ’253+41=294’
5. Once the ‘=’ button is clicked and result of the equation is displayed in the textbox, the next time any button is pressed the previous characters will be erased and new character will be displayed. **Grade 3**

   Example:
   When textbox is showing ’253+41=294’ (i.e. the last button that was clicked is ‘=’), and buttons ‘2’, ‘2’, ‘X’, 3 are pressed, the textbox will show ‘22x3’.

Submission (same requirement for part a and part b):

1. **All code for the project:** Your submission must consist of all .java code and posted to Moodle at the link “Project Part 5 Submission”. In the text submission box, you are required to type in the link to your online Git repository. You are recommended to keep your Git repository private, and to add the TA Xinchao Song to your repository users list, so that your assignment is graded. The Git repository must contain your entire code. Please do not include supporting project directories that arise when you use an IDE. Designate a single person from your team as the ‘submitter’, and submit through their Moodle account.

2. **A report containing an assessment of your contribution and your teammate’s contribution:** This report is a private report that is not to be shared with your teammate. Use one paragraph to discuss your contribution and one paragraph to discuss your teammate’s contributions. This report should be uploaded to Moodle at the link “Project Part 5 Contributions”. Each teammate should submit a report to their own Moodle account.