Computer & Systems Engineering Department

CSE 223: Programing 2

Lab 2

Calculator

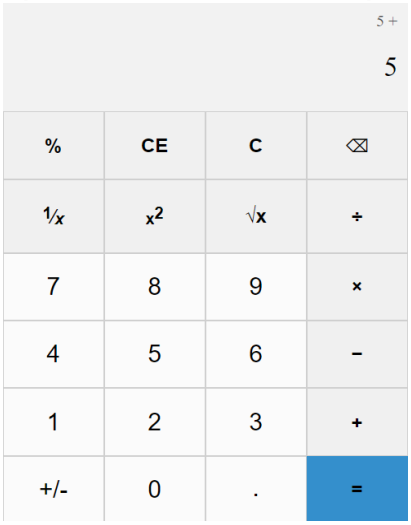
Name: Mohamed Hassan Sadek ID: 20011539

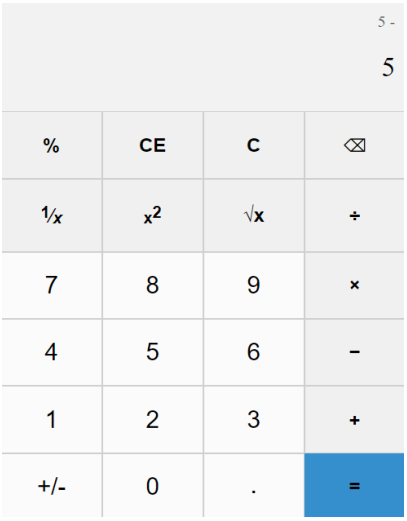
Calculator design:

			0
%	CE	C	⌫
1/x	x^2	√x	÷
7	8	9	×
4	5	6	−
1	2	3	+
+/-	0	.	=

Assumptions:

1. The calculator starts by default with a zero in the screen.
2. There is no difference between the C and CE buttons, both reset the calculator.
3. If the dot button is pressed to enter a floating point number, pressing this button again doesn't do anything to prevent entering multiple dots in one number.
4. If multiple successive operators are pressed, the operator in the screen is updated to the last one pressed:



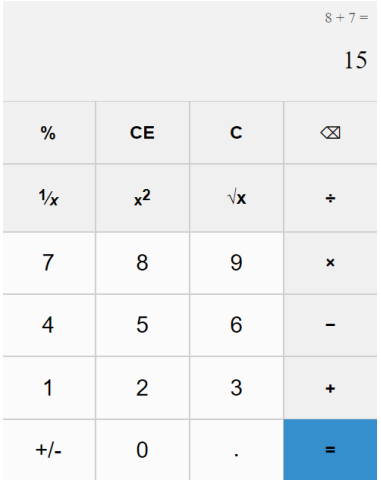


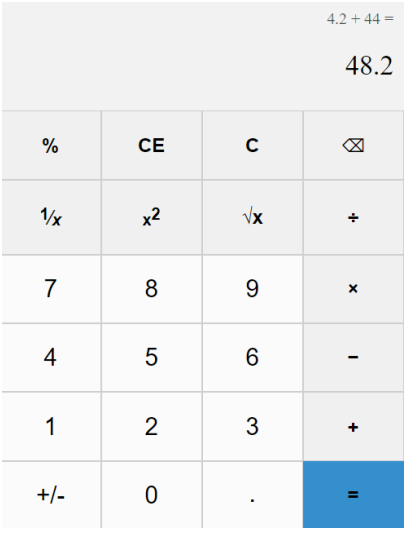
5. It's allowed to perform multiple calculations without pressing the equal button, by just performing the first operation and taking the result to the next operation.
6. The errors:
    - when division by zero "Cannot divide by zero" appears on the screen.
    - when taking a square root of a negative number "Invalid input" appears on the screen.
    - When the answer exceeds the limit of numbers that can be represented "Overflow" appears on the screen.
    - If an error occurs during the calculations, all the buttons do the function of the C/CE buttons to reset the calculator.

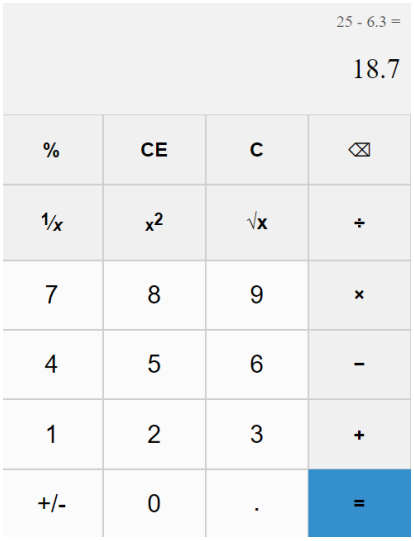
How to use:

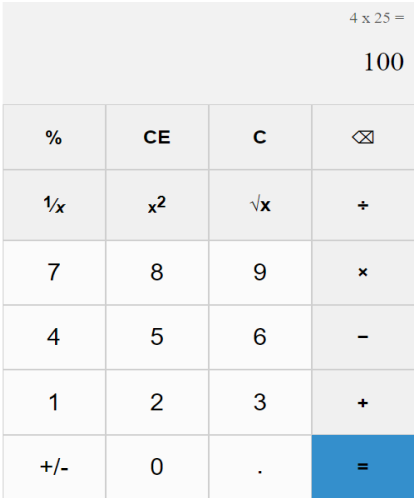
There are two parts of the screen: the top part which views the expression and the bottom part which views the current numbers pressed and the result of any calculations just like that:

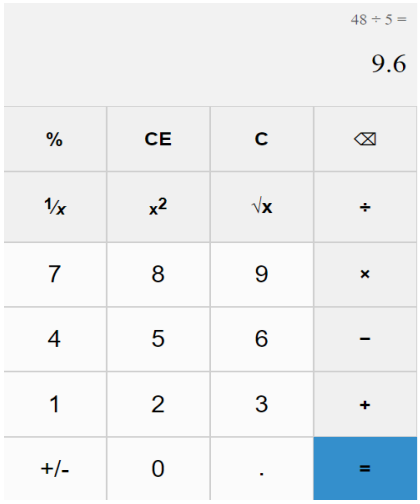
- Addition, subtraction, multiplication, and division are normally used by their corresponding buttons



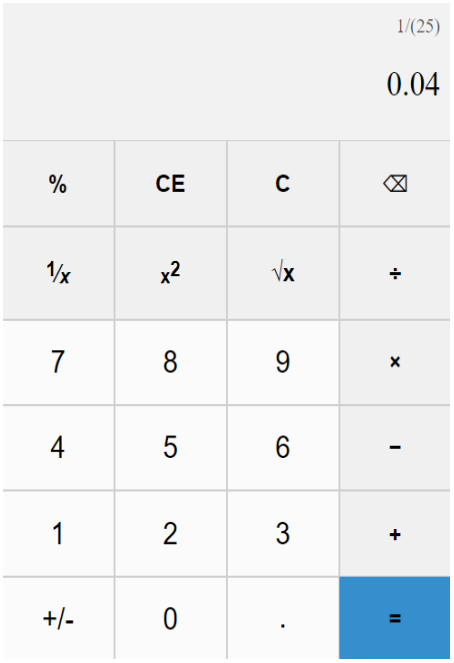


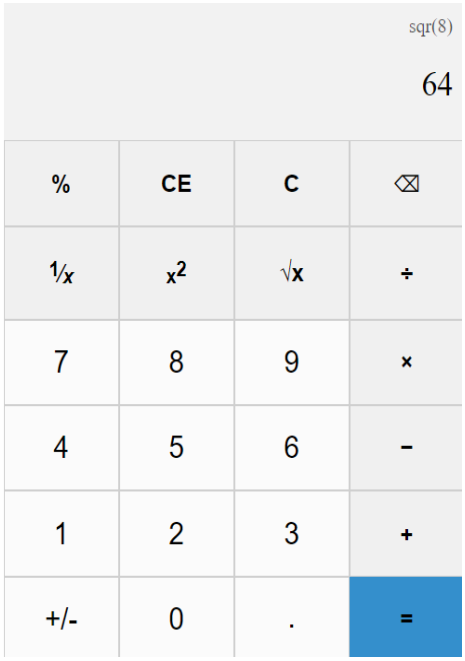


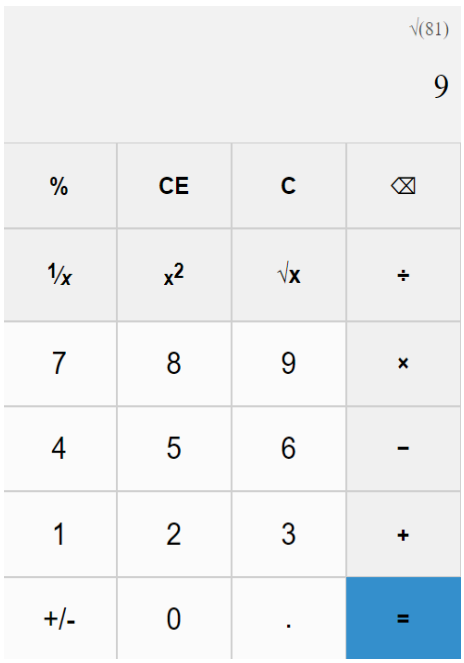




- Fraction, Square, and square root need just one operand to perform the operation, and the result is displayed on the screen. If they are used during double operations(addition, division, …) the result of the single operation(fraction, sqr, sqrt) is first displayed on the screen then you can show the result of the whole expression by pressing the equal button, or just perform another operation and in this case, the result is calculated and is used in the next operation.



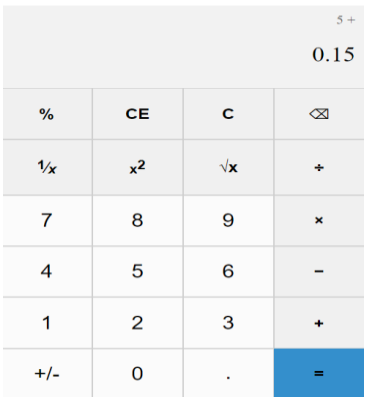




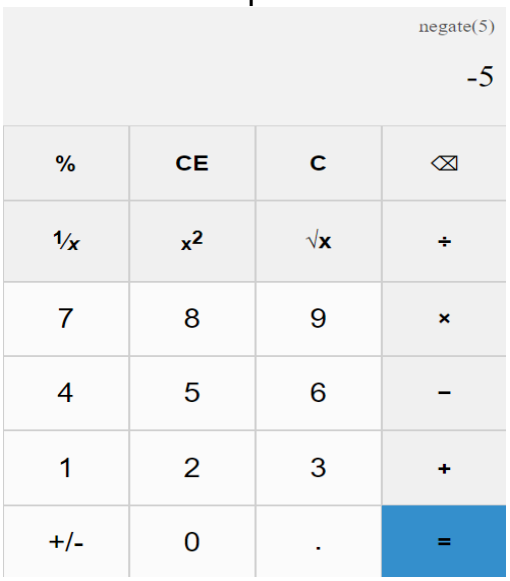
- The percent (%) button performs just like the windows calculator: if it's performed just on one number the result is zero, and if it's performed on a number x with an operation with another number y it performs like that (y * (x/100)).

Before pressing %:
We pressed 5 + 3

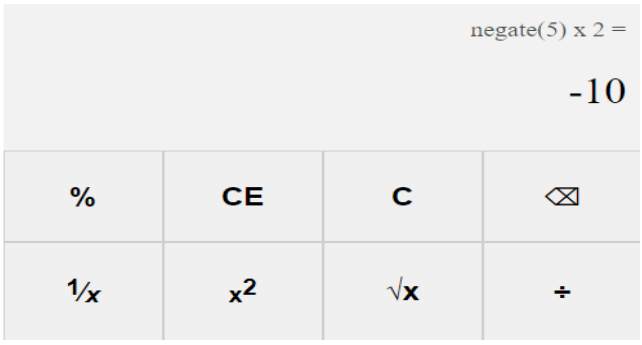
after pressing %:
here's the result of the % which will be used in the addition



- The +/- button perform negation on the number(convert positive to negative and negative to positive):
  To enter -5 first press 5 then +/- button:

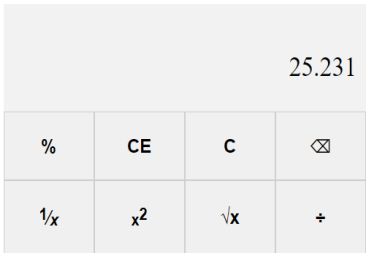


Then you can use -5 in another operation:

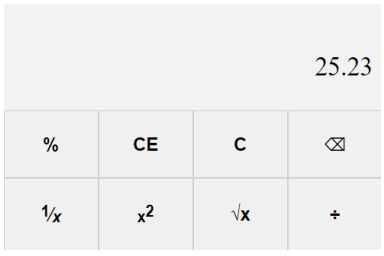


- The backspace button clears the digit of the number displayed in the bottom part of the screen

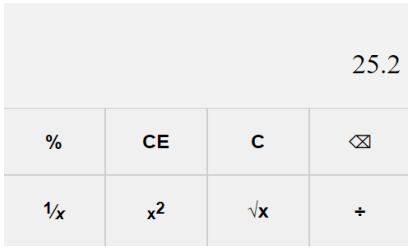
Before:



After one backspace:

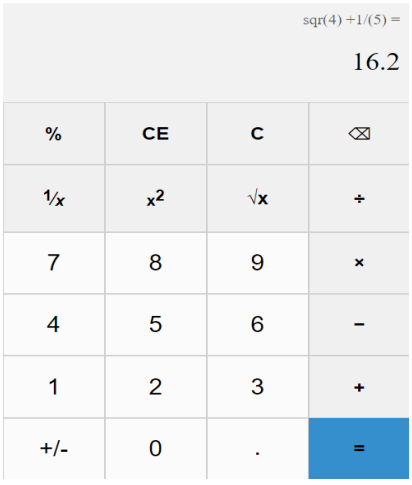


After 2 backspaces:

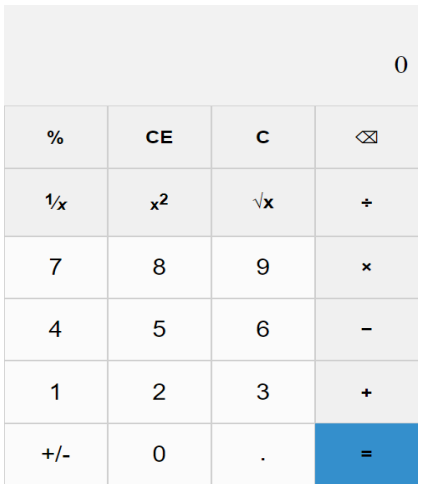


- The C/CE buttons reset the calculator

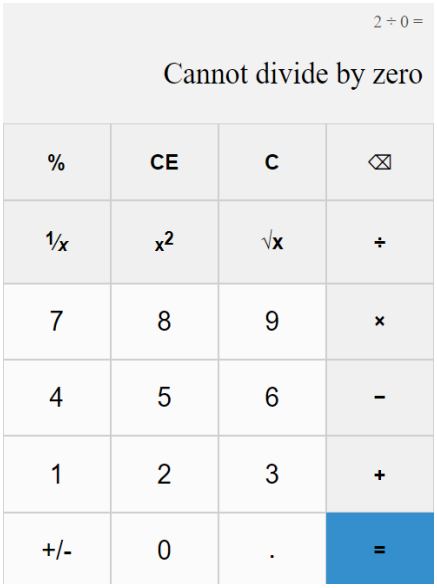
Before:

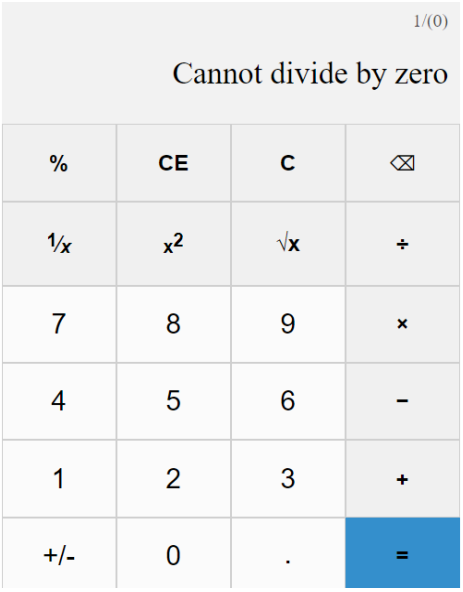


After:

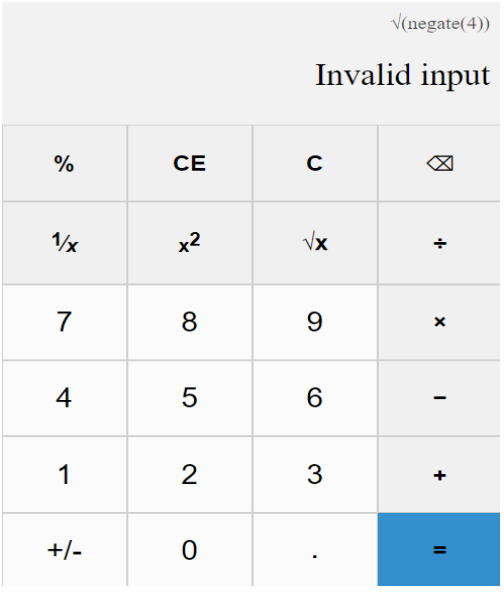


- The errors:
  Division by 0:

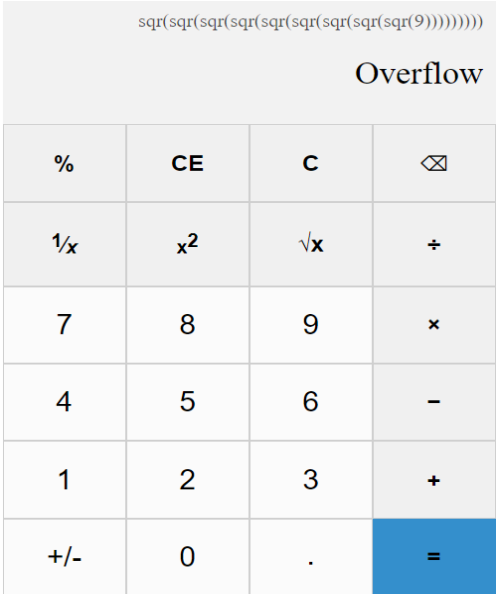




Square root of a negative number:



Overflow:



There is a link to a video showing how to use the calculator:

[How-to-use-calculator]

How to run the project:

- Open the springboot folder and run the application.
- The application is run on port 9090. If you want to change the port go to application.properties and change but you have to change it in the angular folder too (the link is in the file “calculator.service.ts”).
- Open the angular folder in vsCode.
- Open the terminal.
- Install npm using the command (npm install)
- Enter the command (ng serve) in the terminal
- Go to the link “http://localhost:4200/”
- Then you can use the calculator.
