

SmartCalc_v2.0

User Manual

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1 Introduction

The SmartCalc_v1 is developed in C language of C11 standard using gcc compiler.

GUI implementation is done using Qt 6.2.3 library.

The program builds with Makefile, which contains the following targets: all, s21_calculator.a, test, install, uninstall, dist, dvi, gcov_report, check, clean, rebuild.

The program developed according to the principles of structured programming, when writing the code, the Google style was used.

Full coverage of the code with unit tests is provided using the Check library.

Both integers and real numbers with a dot can be input into the program. The calculation is done after you complete entering the calculating expression and press the = symbol.

Calculating arbitrary bracketed arithmetic expressions in infix notation. Calculate arbitrary bracketed arithmetic expressions in infix notation with substitution of the value of the variable x as a number.

Plotting a graph of a function given by an expression in infix notation with the variable x (with coordinate axes, mark of the used scale and an adaptive grid). Domain and codomain of a function are limited to at numbers from -1000000 to 1000000.

Users are able to enter up to 255 characters.

Bracketed arithmetic expressions in infix notation support the following arithmetic operations and mathematical functions:

Arithmetic operators:

Operator name	Infix notation (Classic)
Brackets	(a + b)
Addition minus	a + b
Subtraction	a - b
Multiplication	a * b
Division	a / b
Power	a ^ b
Modulus root	a Mod b
Unary plus root	+a
Unary minus	-a

Mathematical functions:

Function description	Infix notation (Classic)
Computes cosine	cos(x)
Computes sine	sin(x)
Computes tangent	tan(x)
Computes arc cosine	acos(x)
Computes arc sine	asin(x)
Computes arc tangent	atan(x)
Computes square root	sqrt(x)
Computes natural logarithm	ln(x)
Computes common logarithm	log(x)

Bonus. Credit calculator.

The program gets the following parameters from the user:

- loan amount;
- loan term in months or years;
- annual interest rate;
- payment type (annuity or differentiated).

The program calculates the following values:

- monthly payment amount;
- total amount of overpayment;
- total amount of payment;
- payment schedule with adjusted last payment.

2 Installation

To install the program, you need to go to the src directory and run the following commands in the terminal:

- `make install`

It will create a directory 'build' and compile the program, copy the program to the ~/Desktop directory.

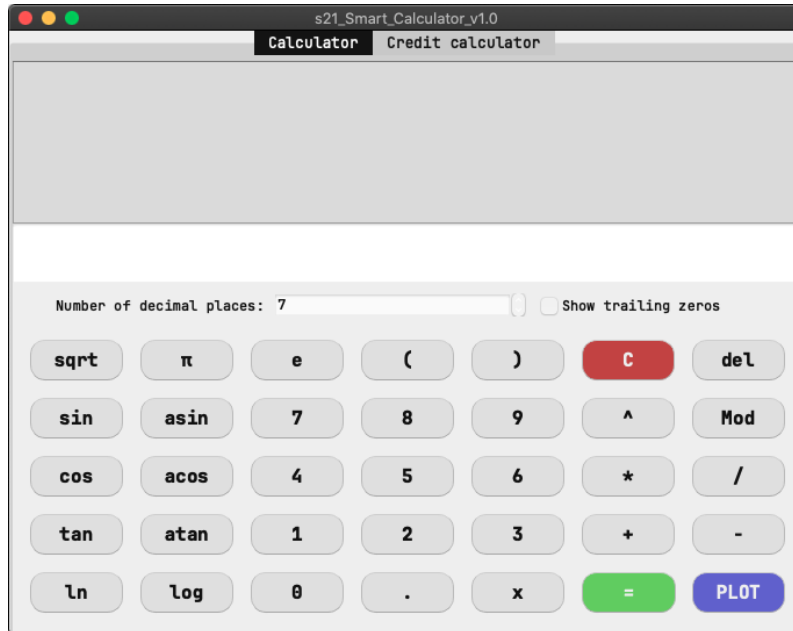
If you want to uninstall the program, you need to go to the src directory and run the following commands in the terminal:

- `make uninstall`

It will remove the directory 'build' and delete the program from the ~/Desktop directory.

3 Usage

To run the program after installation, you need to go to the `~/Desktop` directory and double-click on the `SmartCalc_v2.0` icon. The program will start and you will see the following window:



You can enter an expression using both the numeric keypad with the mouse, and directly edit the input field from the keyboard. While you did not put the cursor in the input field, you can use the following keyboard shortcuts:

- *C* - cos;
- *S* - sin;
- *T* - tan;
- *O* - acos;
- *I* - asin;
- *A* - atan;
- *Q* - sqrt;
- *L* - ln;
- *G* - log;
- *M* - Mod;
- *backspace* - delete the last character;
- *return* - open plot window;
- *E* - input number e;
- *P* - input number pi;
- *X* - input variable x;

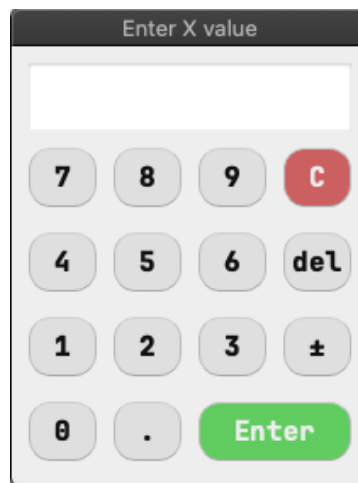
There are also shortcuts for all arithmetic operations and numbers.

In the main window there is an option to change the number of decimal places displayed. The default is 7 decimal places. You can change the number of decimal places from 0 to 16.

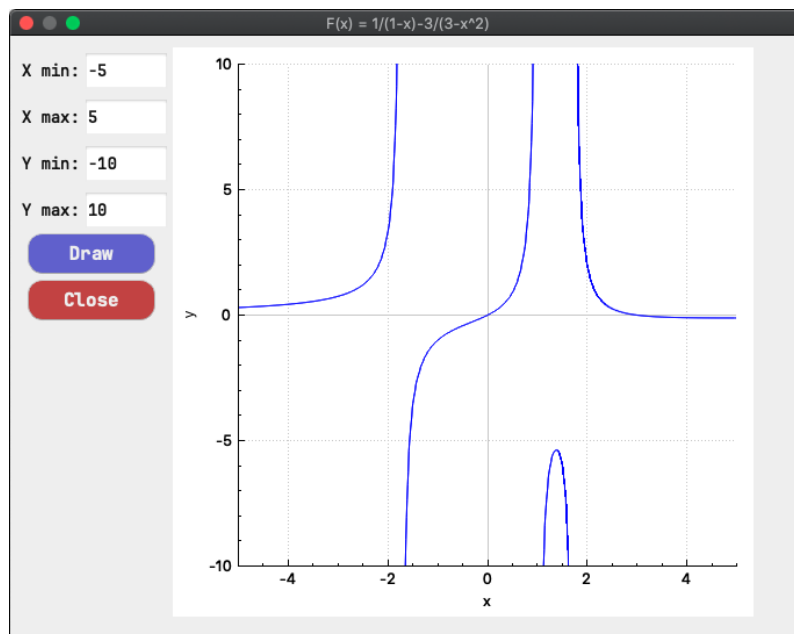
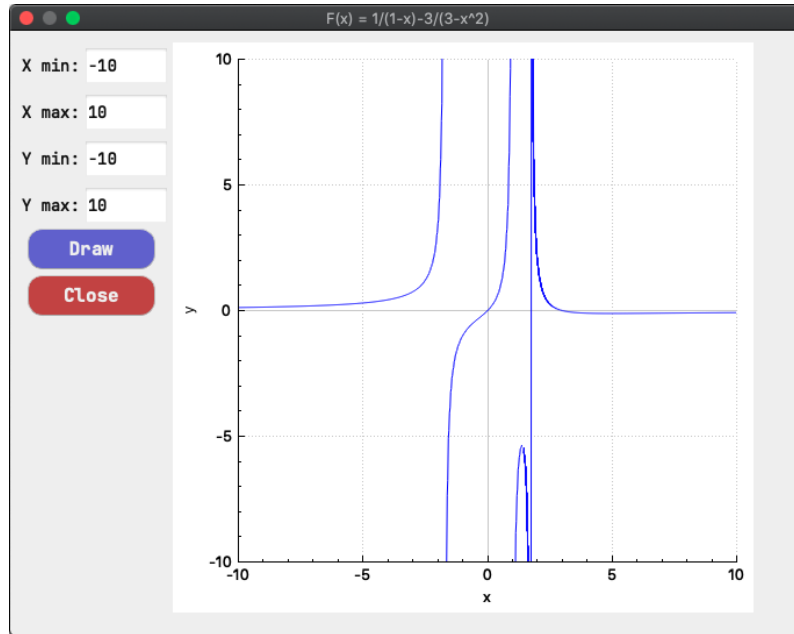
There is also an option to show insignificant zeros. By default, insignificant zeros are not displayed.

After entering the expression, you need to press the = key to calculate the result. If the expression is entered incorrectly, the program will display an error message and the result will not be calculated. If the expression is entered correctly, the program will display the result in the output field and the expression will be added to the history.

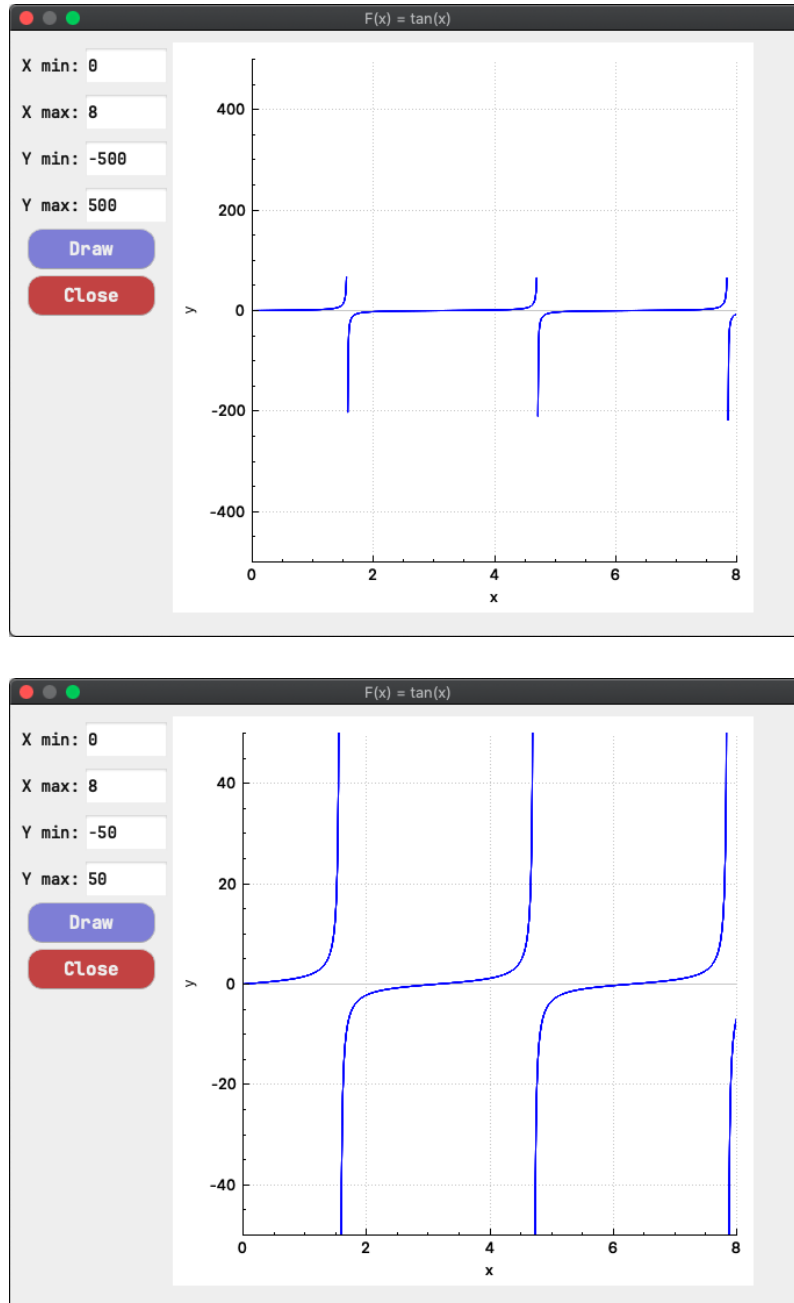
If the input expression contains the variable x , the program will display the window for entering the value of the variable x .



After entering the expression if you press the *PLOT* button, the program will display the plot window. To draw a graph, you need to enter the displayed domain and codomain values limited to at numbers from -1000000 to 1000000 and press the *PLOT*. If the entered values are incorrect, the program will display an error message and the graph will not be drawn. If the entered values are correct, the program will display the graph in the plot window.



Note. The program can draw graphs of functions with discontinuity points of the second kind incorrectly on the large domain. This is due to the limitations of the library used to draw graphs. To avoid this, you need to limit the domain of the function.



Note. The program can draw graphs of functions with asymptotic points incorrectly on the large codomain. This is due to the limitations of the library used to calculate the function. To avoid this, you need to limit the codomain of the function.

To close the plot window, you need to press the **CLOSE** button. The function drawn in the plot window will be added to the history.

Calculator Credit calculator

Amount of credit: 100000

Credit term: 1 Years

Interest rate: 23.45

Type of monthly payments: ☒ Annuity ☐ Differentiated

CALCULATE

Monthly payment: 9429.36;
Interest charges: 13152.32;
Debt + interest: 113152.32;

Payment schedule:

Nº	Amount of	Principal	Interest	Balance
Nº:	payment:	payment:	payment:	owed:
1	9429.36	7475.19	1954.17	92524.81
2	9429.36	7621.27	1808.09	84903.54
3	9429.36	7770.20	1659.16	77133.34

To use the credit calculator, you need switch to the credit calculator tab. After entering the parameters, you need to press the *CALCULATE* button. The program will display the payment schedule with adjusted last payment.

4 Bugs

Although the program can be installed on Linux, the interface was designed for MacOS, so the interface may differ on Linux.

There is a significant bug in the program installed on Linux. The program discards all fractional parts of numbers. This bug does not occur on MacOS.