

1 User Guide

This calculator application offers fundamental mathematical operations on real numbers (+, −, ·, ÷) as well as more advanced ones ($x!$, x^n , $\sqrt[n]{x}$, $\sin x$). It supports evaluation of 1 operation at the time and stores partial results into memory, so that another operator may be applied afterwards. Application can be controlled through graphical user interface and partially with use of keyboard. (for more information see section User input)

Application layout

Application consists of 2 main components - display and calculator keyboard (see Figure 1).

Display contains two values. The first one on the right presents current value inserted by user. The second one in the top left corner presents result of the last evaluated expression.

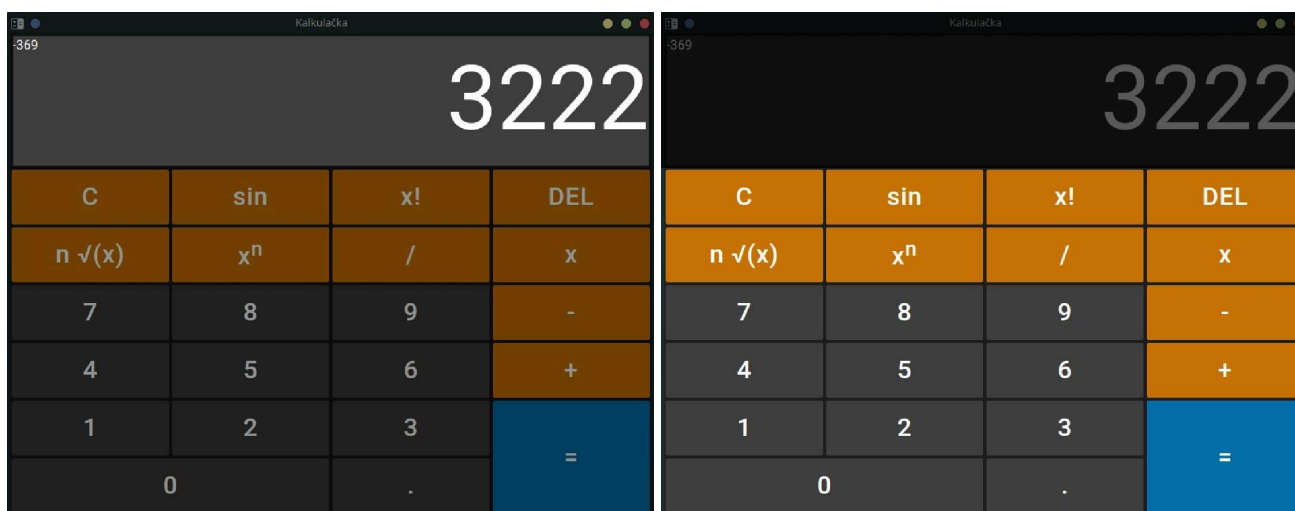


Figure 1: Calculator layout components

User input

Application can be easily controlled through graphical user interface by clicking certain buttons. Alternatively, numerical input as well as **DEL**, **C**, **=** and operators +, −, ·, ÷, x^n can be entered using the keyboard. For completeness, a table of individual buttons with their purpose and keyboard equivalent is attached.

Calculator symbol	purpose	keyboard equivalent
0,1,2,3,4,5,6,7,8,9,.	buttons for numerical input	any key representing given symbols
C	clear calculator current and history value	delete
DEL	delete last digit	backspace
=	evaluate operation	enter
+	addition	any sequence representing +
+	subtraction	any sequence representing −
·	multiplication	any sequence representing *
÷	division	any sequence representing /
x^n	x to the power of n	any sequence representing ^
$\sqrt[n]{x}$	n-th root of x	-
$x!$	factorial	-
$\sin x$	sinus	-

Using binary operators ($+$, $-$, \cdot , \div , $\sqrt[n]{x}$, x^n)

There are two ways how to use binary operators. Both are shown in Usage graph below.

The first one includes these steps. **Enter a number** in the first place. Then **choose a binary operator**. **Enter second number**. At last click $=$ to evaluate expression and store result into memory. Eventually, choose another operator and enter another number and then click $=$ again. In this case the value in the calculator memory is used as the first operand. These steps may be repeated until you click **C**, which clears calculator.

The second one differs just a little. **Enter a number** in the first place. Then **choose a binary operator**. **Enter second number**. For now **choose another operator**, which leads to evaluation of last operation and storage of partial result into memory (value in the top left corner). Then **enter another number** and evaluate this operation either by clicking $=$ or choosing another operation.

This sequence of steps can be repeated until you click **C**, which clears calculator.

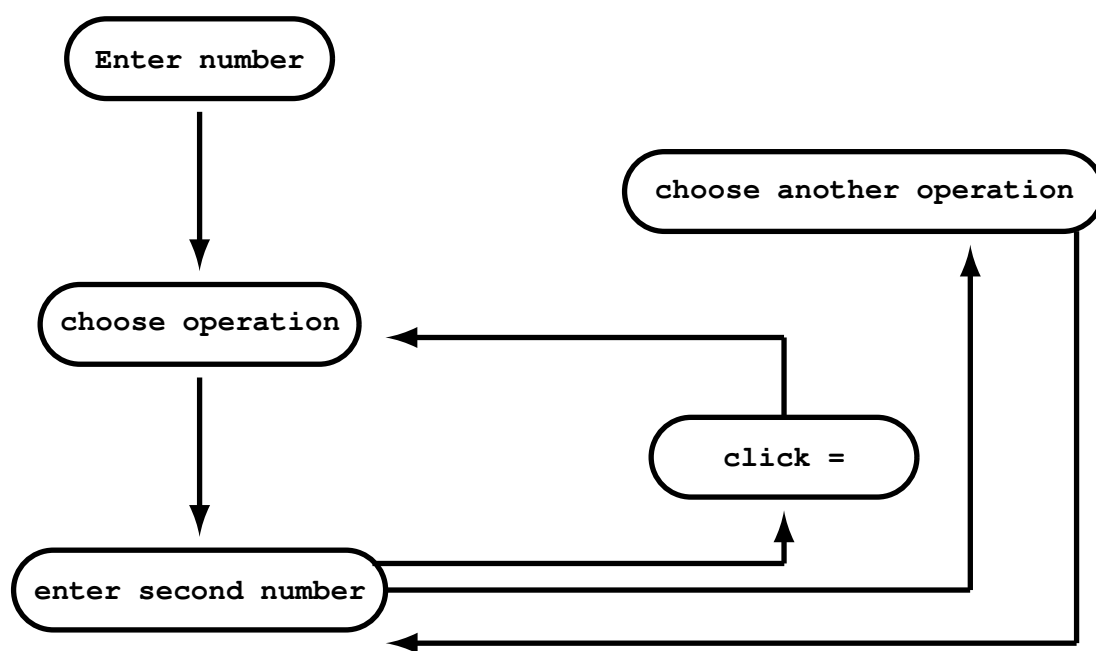


Figure 2: Usage graph

To get rid of ambiguity about $\sqrt[n]{x}$ and x^n usage, order of their operands is further described. Both operators consider a number entered first as x and a number entered afterwards as n .

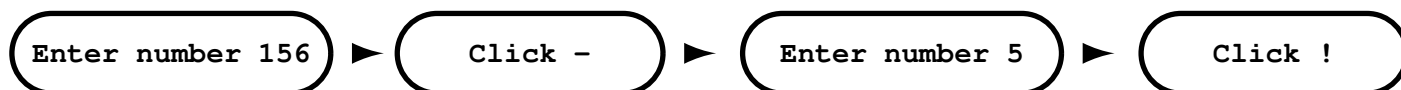
How to use unary operators ($\sin x$, $x!$)

Unary operator can be used in 2 ways.

1. Applied to the display value.
2. Applied to the last result in memory.

For deeper understanding, please, follow 2 attached examples below.

Example 1. - $156 - 5!$



Example 2. - $(156 - 5)!$

