Function Plotter

- This project is for Master Micro Company.
- Language: Python
- Development environment: PyCharm
- Project type: Desktop Application

Aim

plots arbitrary user-entered function.

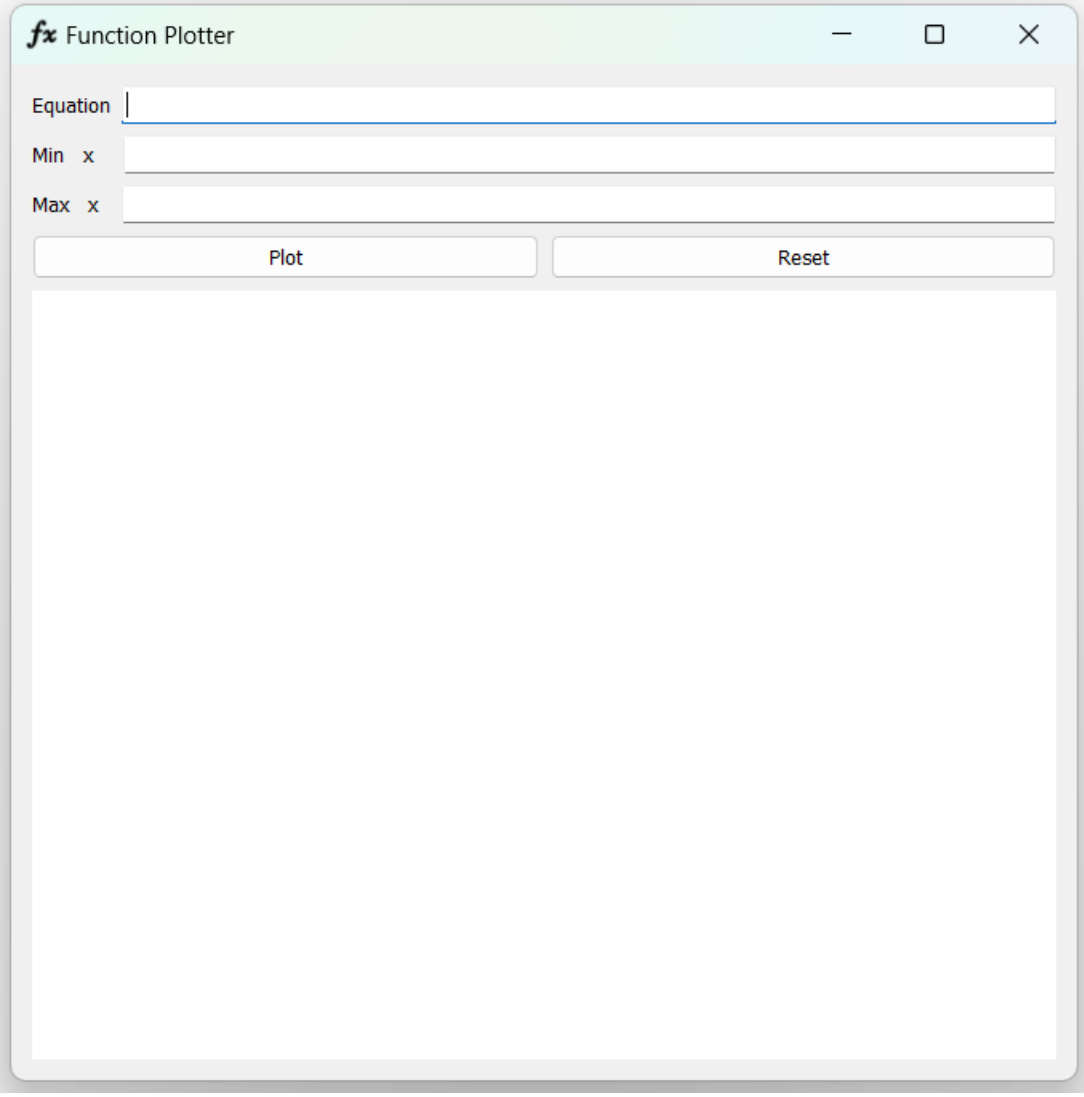
Procedure Details

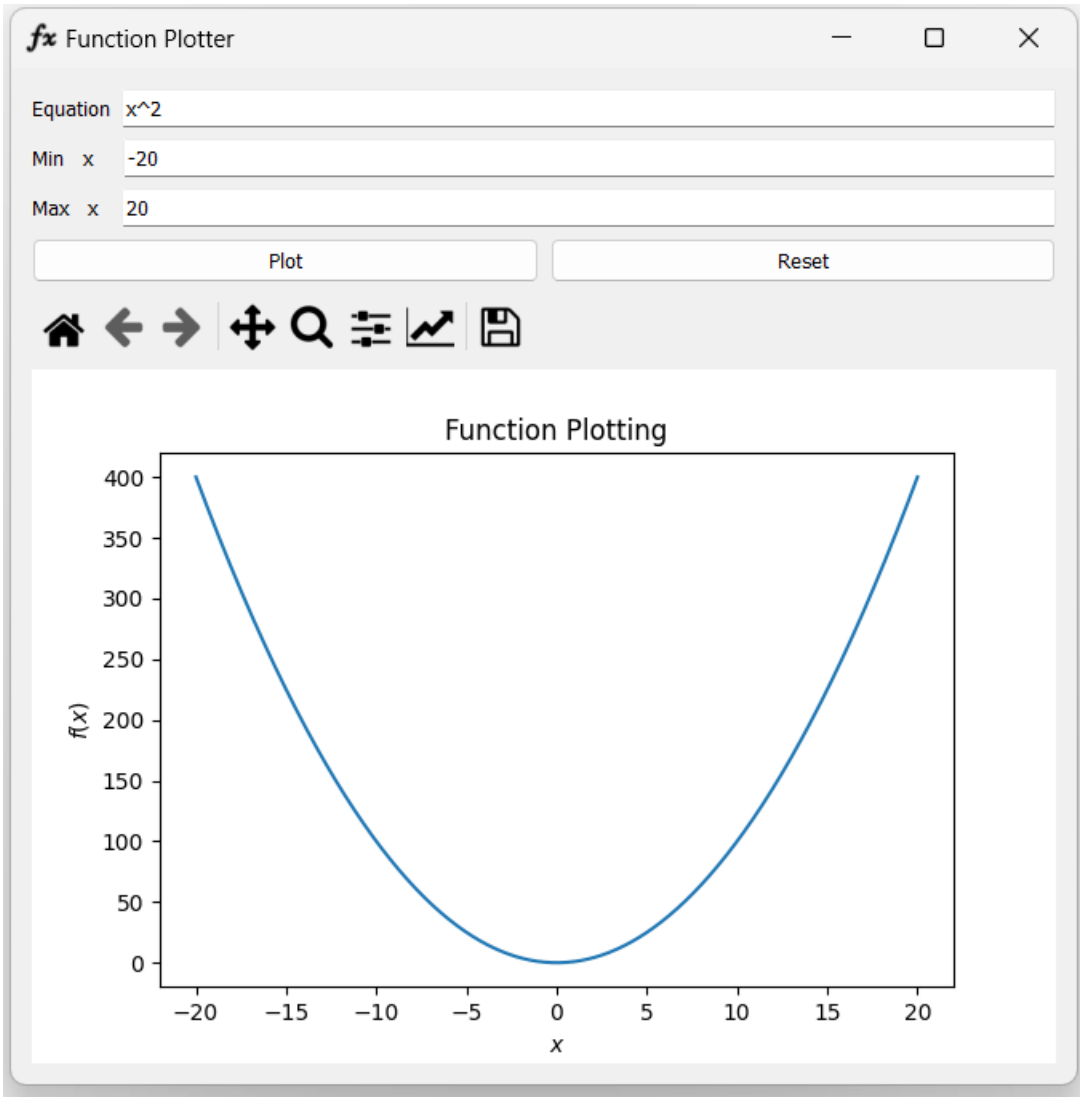
1. Write a Python GUI program that plots an arbitrary user-entered function.
2. Take a function of x from the user, e.g., 5*x^3 + 2*x.
3. Take min and max values of x from the user.
4. The following operators must be supported: + - / * ^ sin cos tan.
5. Apply appropriate input validation to the user input.
6. Display messages to the user to explain any wrong input.

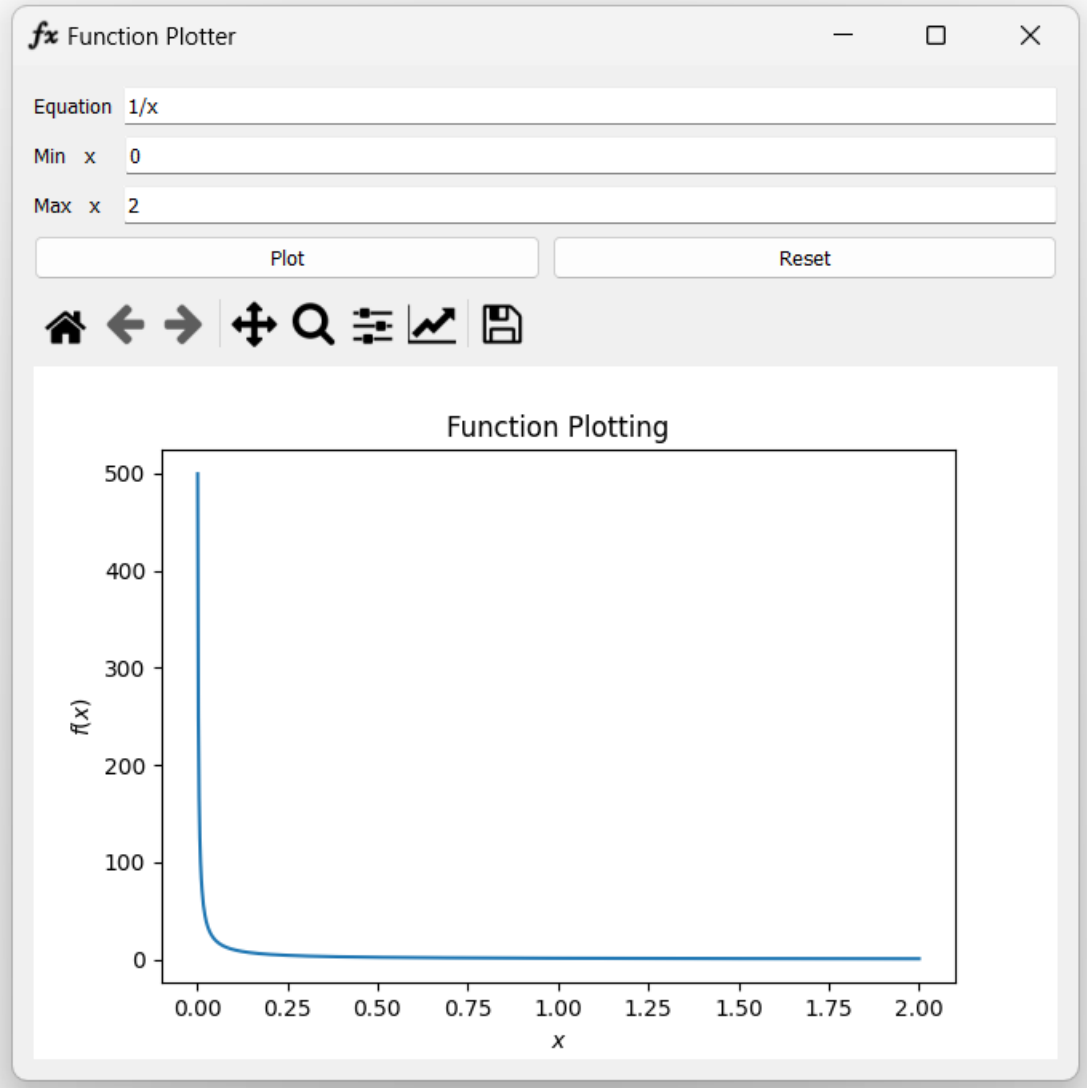
Extra Features

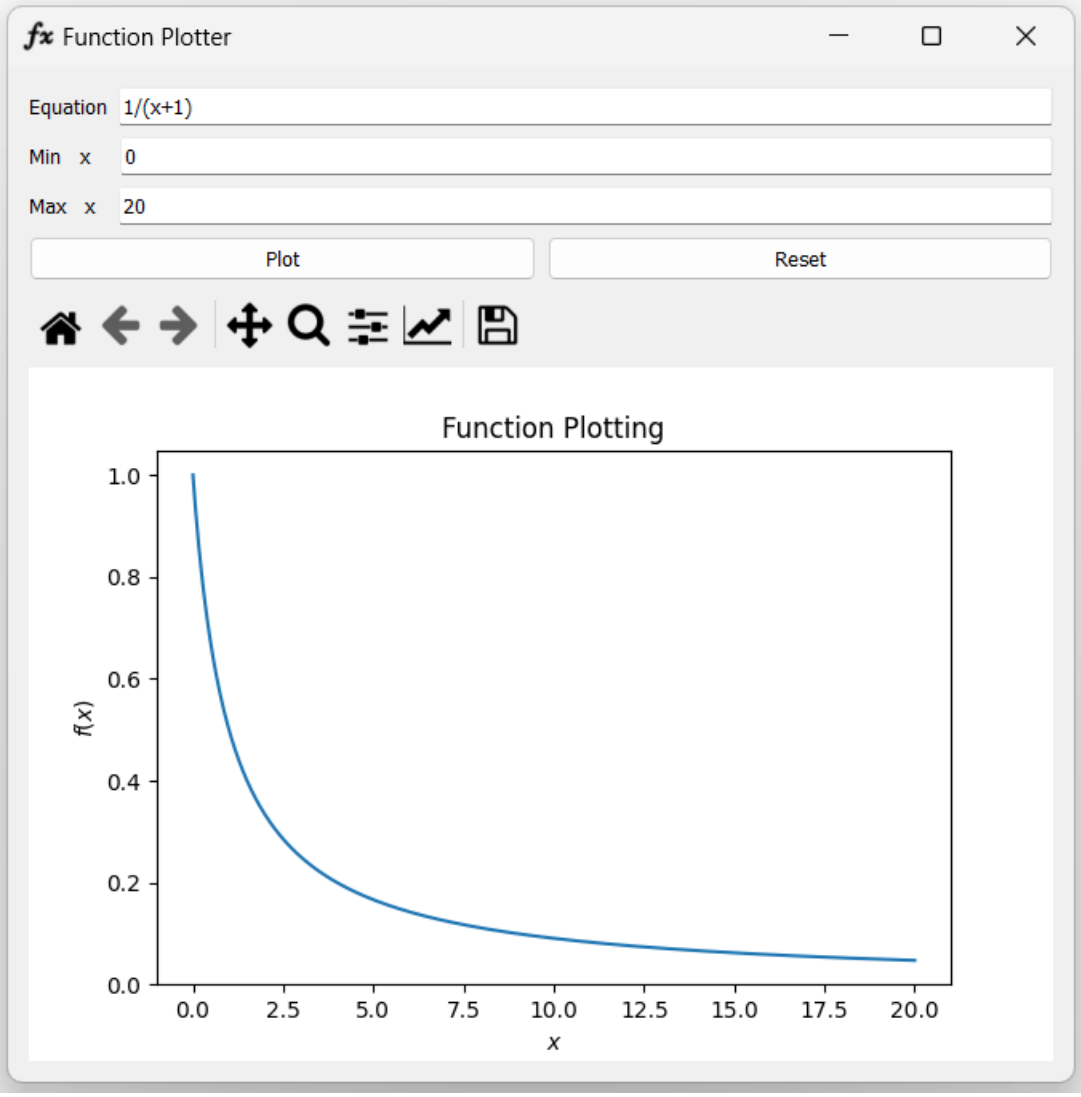
- support sin, cos, tan, sqrt and e
- user can enter constant instead of expression of x
- user can enter function in any one of this forms
    - y = expression
    - expression
- add features provided by NavigationToolbar2QT like
    - saving the plot to a file
    - panning and zooming the plot
    - resetting the view

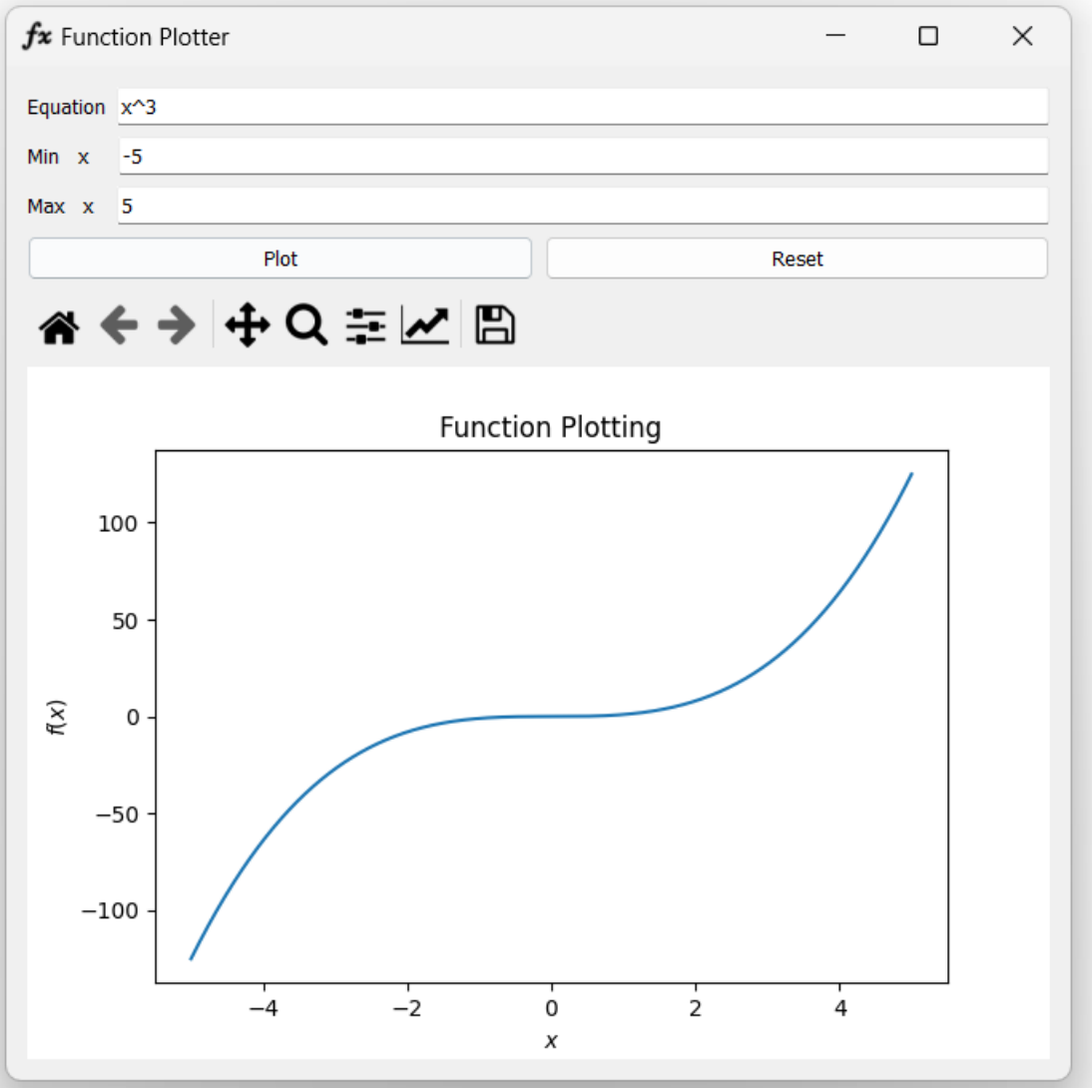
Output

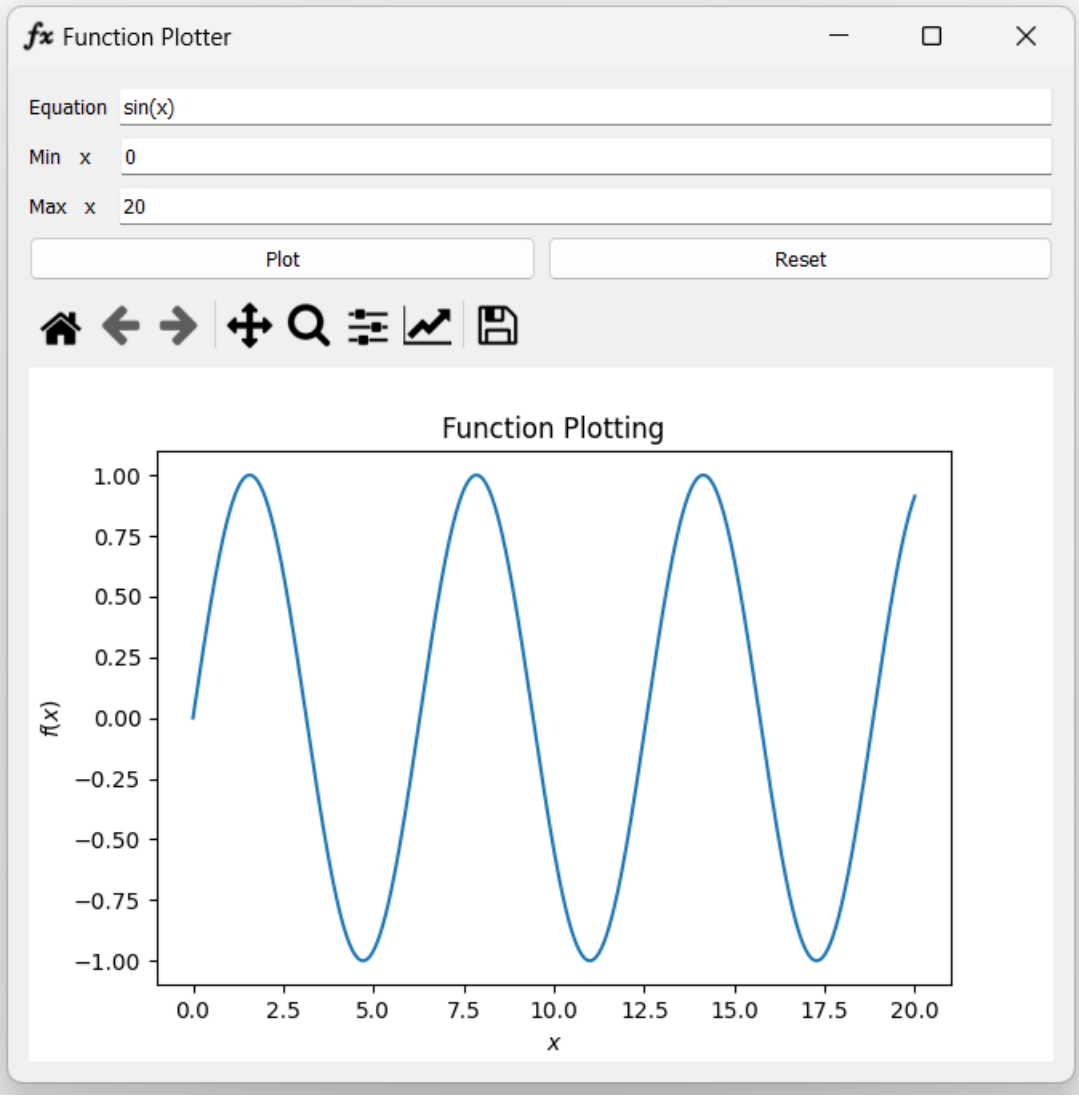


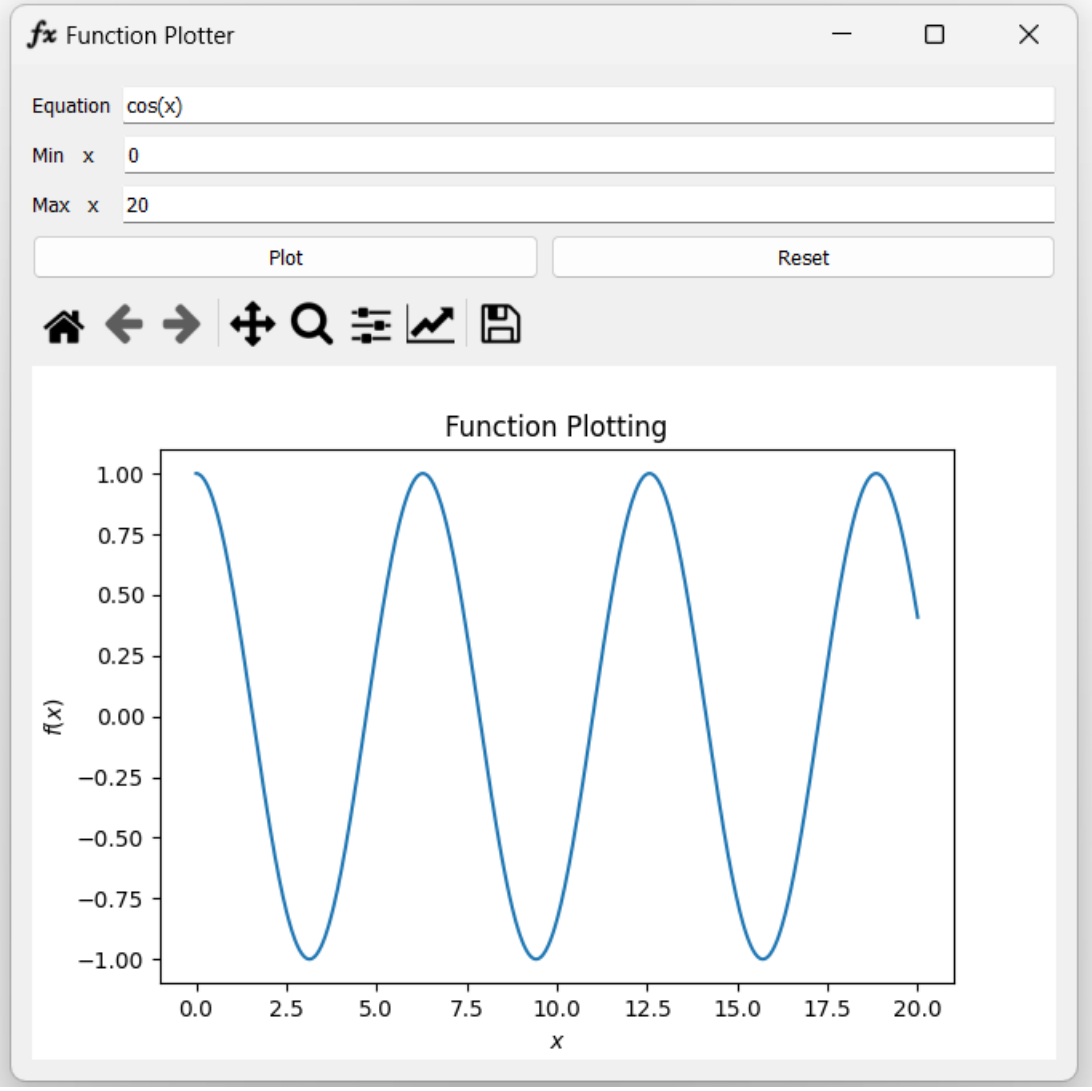

Function Plotter
Equation
x^2
Min x
-20
Max x
20
Plot
Reset
Function Plotting
400
350
300
250
200
150
100
50
0
f(x)
−20
−15
−10
−5
0
5
10
15
20
x

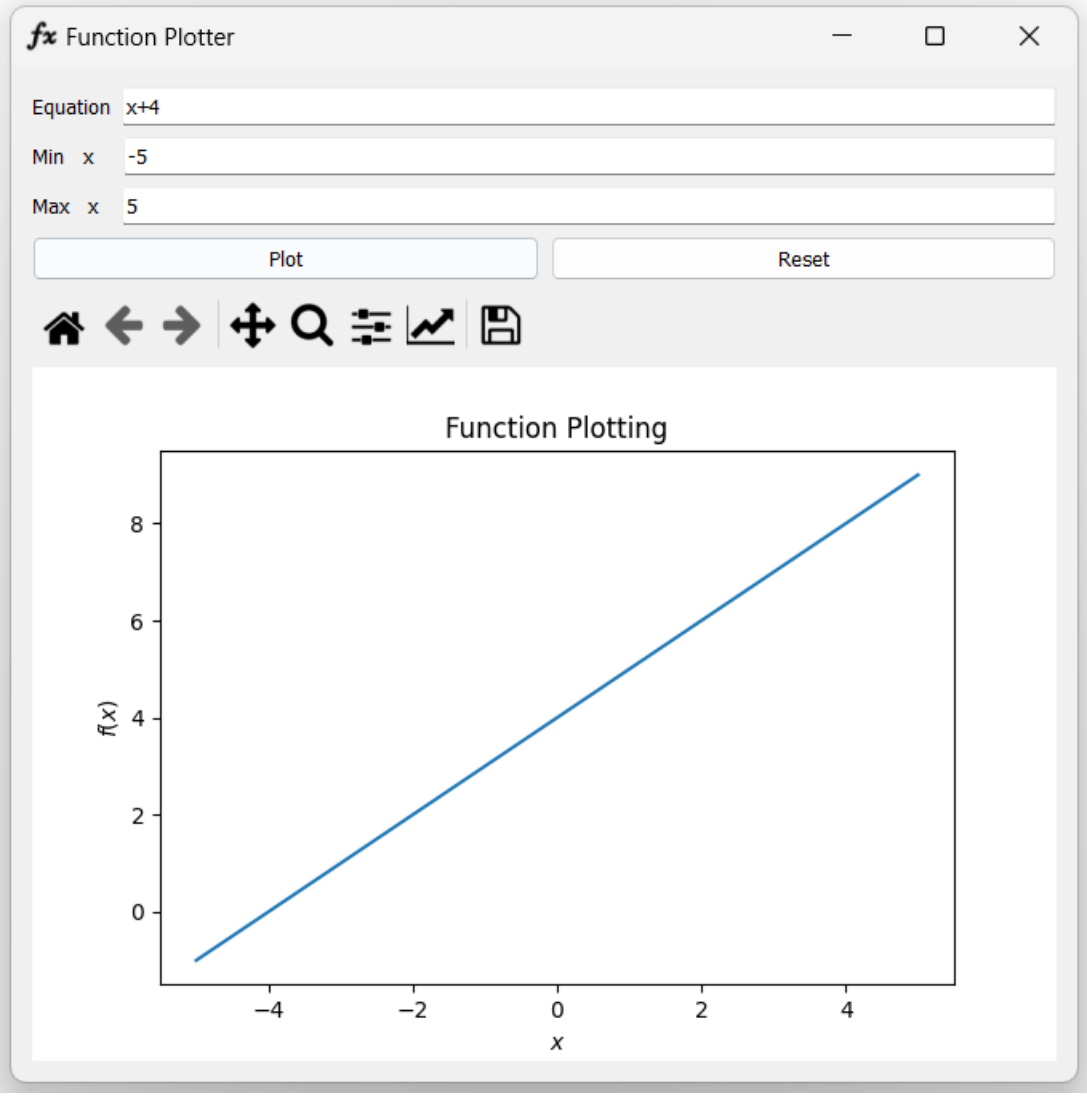

Function Plotter
Equation
1/x
Min x
0
Max x
2
Plot
Reset
Function Plotting
500
400
300
200
100
0
f(x)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
x

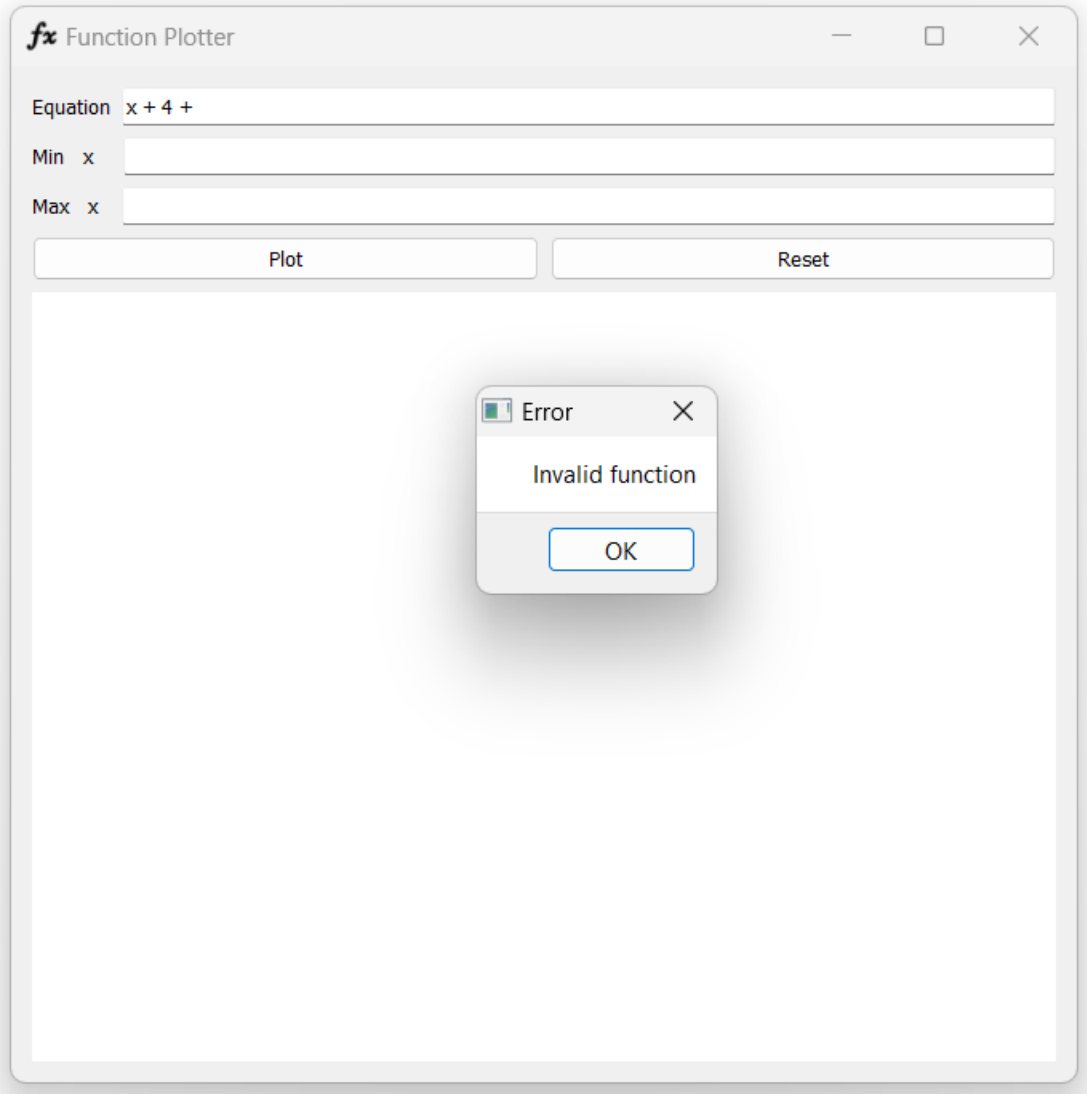

Function Plotter
Equation
1/(x+1)
Min x
0
Max x
20
Plot
Reset
Function Plotting
1.0
0.8
0.6
0.4
0.2
0.0
f(x)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
x

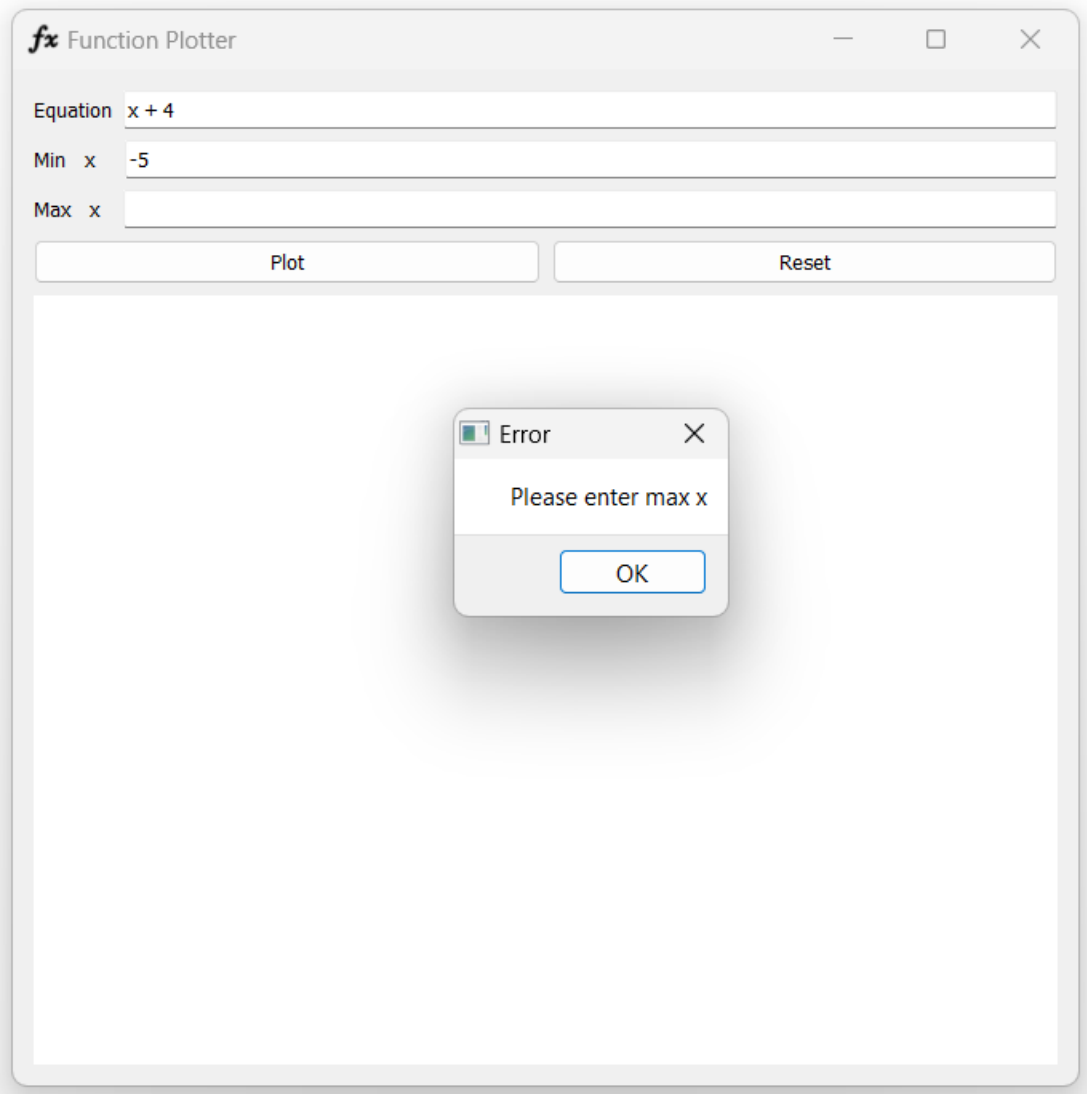

Function Plotter
Equation
x^3
Min x
-5
Max x
5
Plot
Reset
Function Plotting
100
50
0
−50
−100
f(x)
−4
−2
0
2
4
x

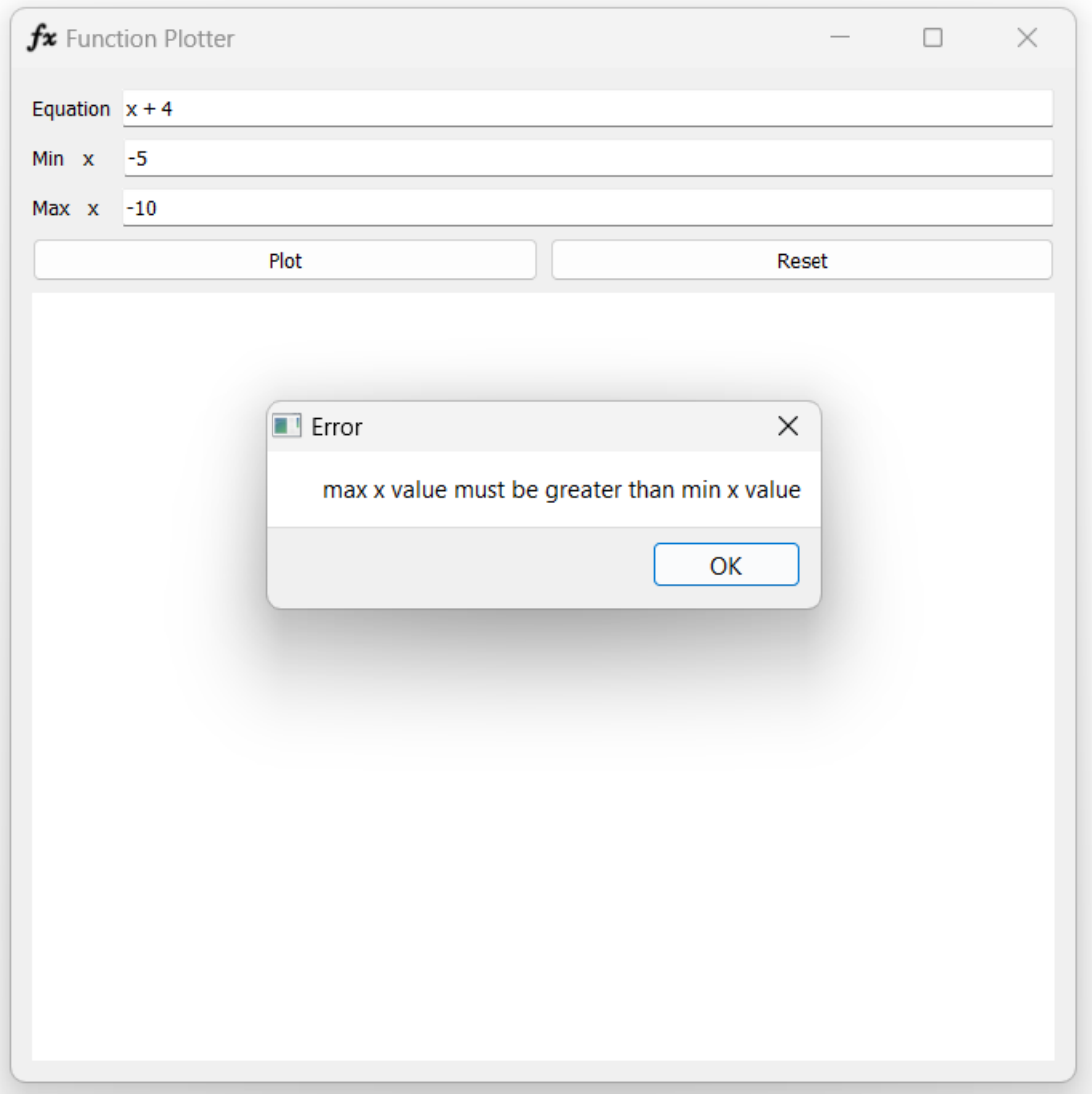

Function Plotter
Equation
sin(x)
Min x
0
Max x
20
Plot
Reset
Function Plotting
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
f(x)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
x

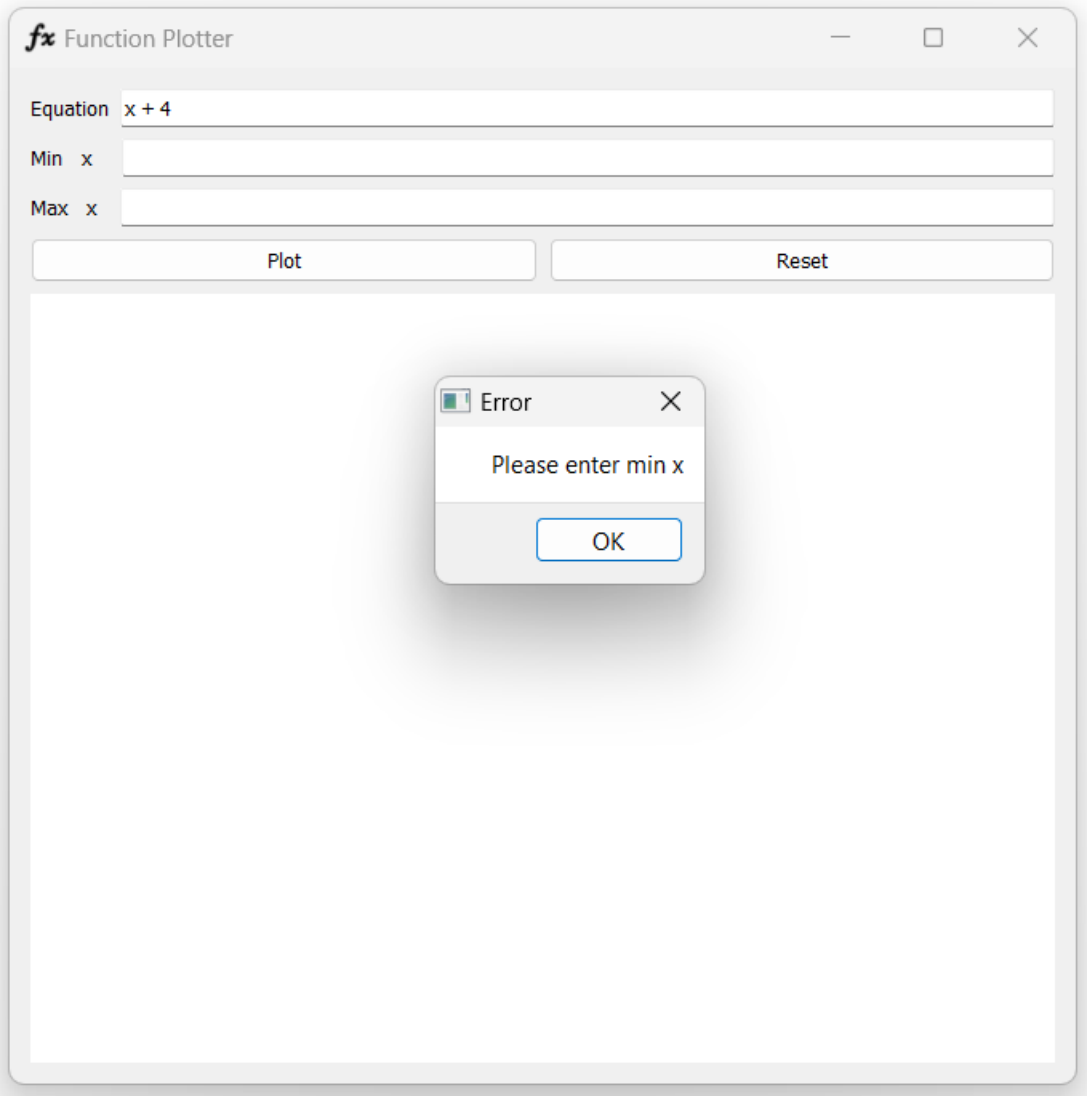

Function Plotter
Equation
cos(x)
Min x
0
Max x
20
Plot
Reset
Function Plotting
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
f(x)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
x

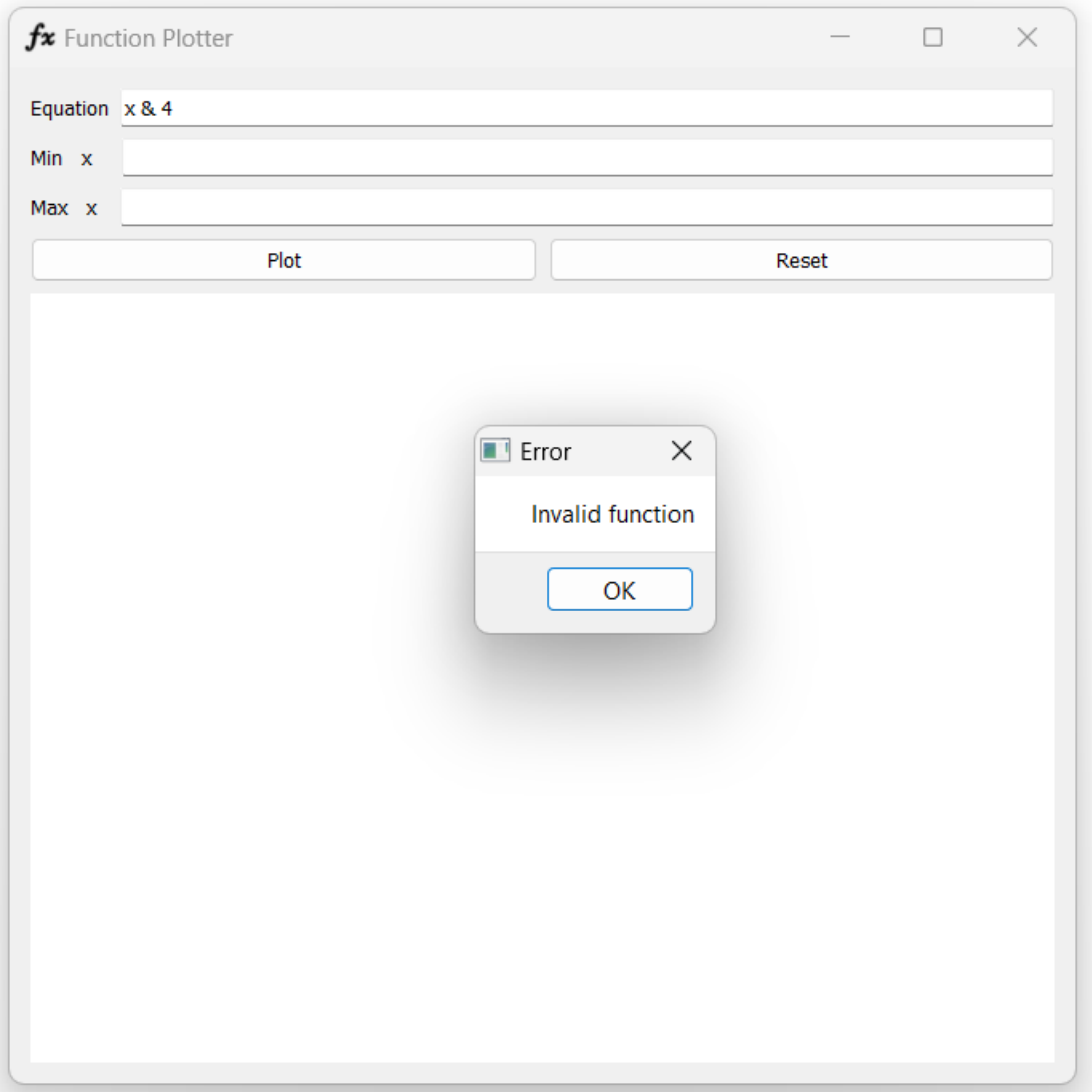

Function Plotter
Equation
x+4
Min x
-5
Max x
5
Plot
Reset
Function Plotting
8
6
4
2
0
f(x)
−4
−2
0
2
4
x

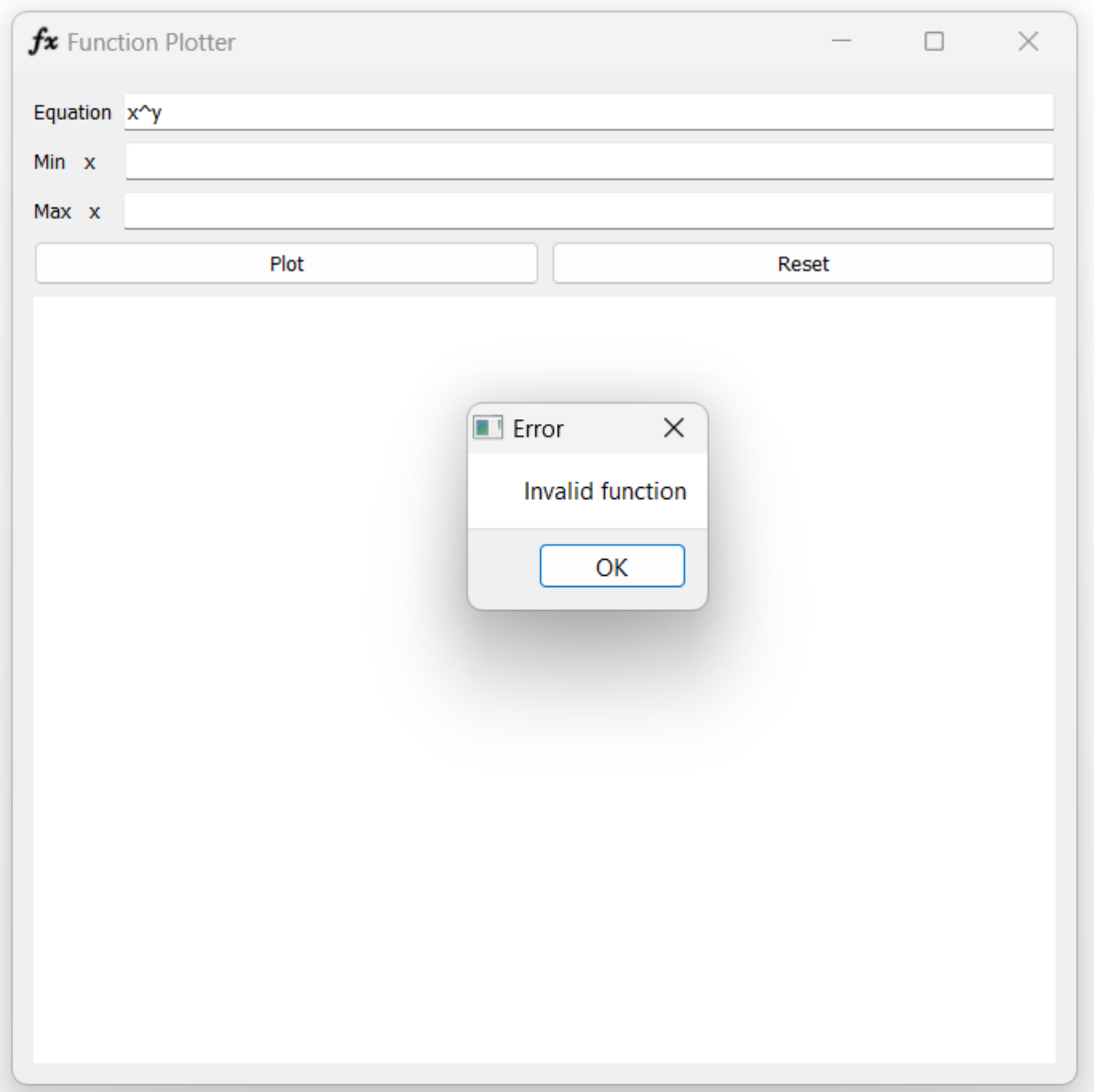

Function Plotter
Equation
x + 4 +
Min x
Max x
Plot
Reset
Error
Invalid function
OK

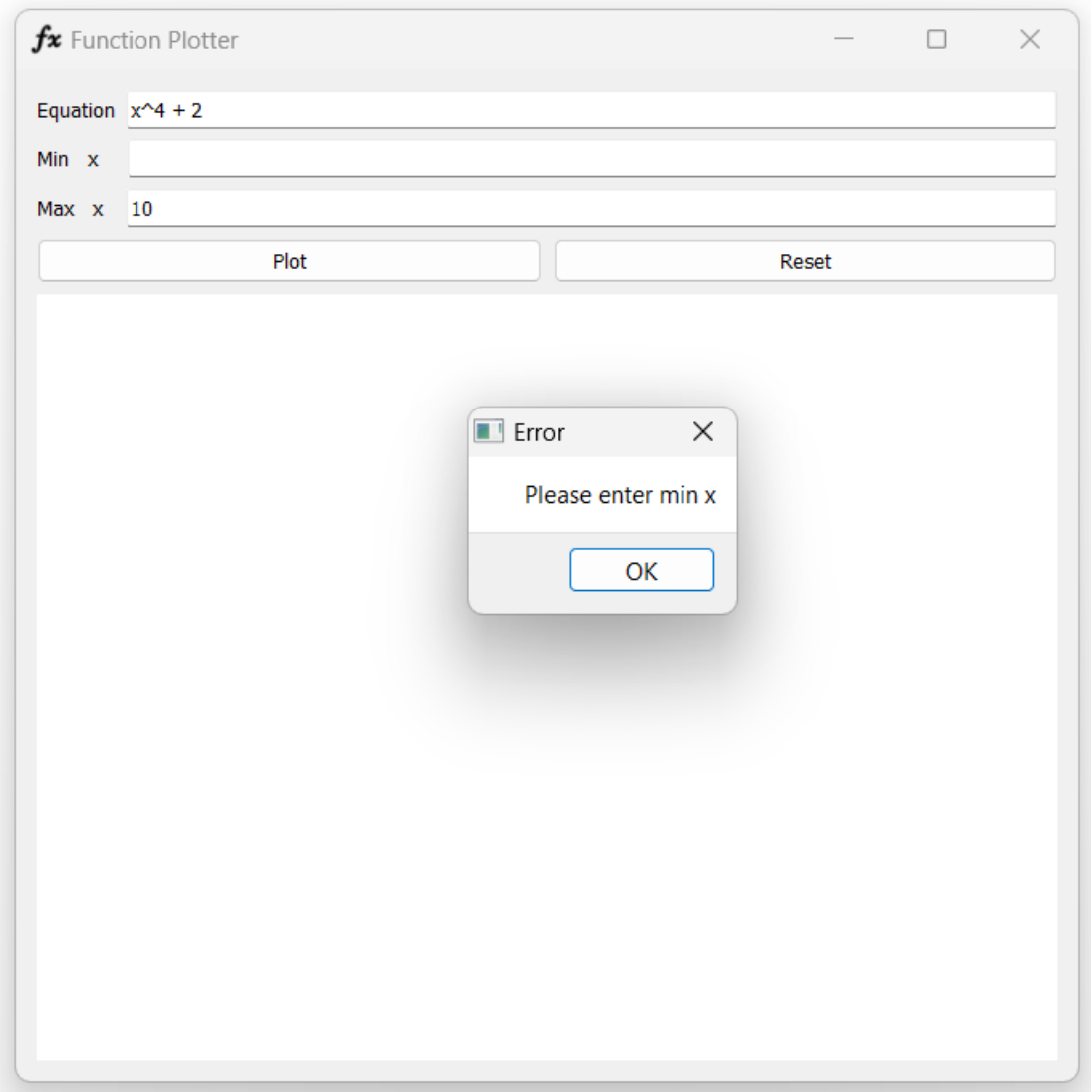

Function Plotter
Equation
x + 4
Min x
-5
Max x
Plot
Reset
Error
Please enter max x
OK

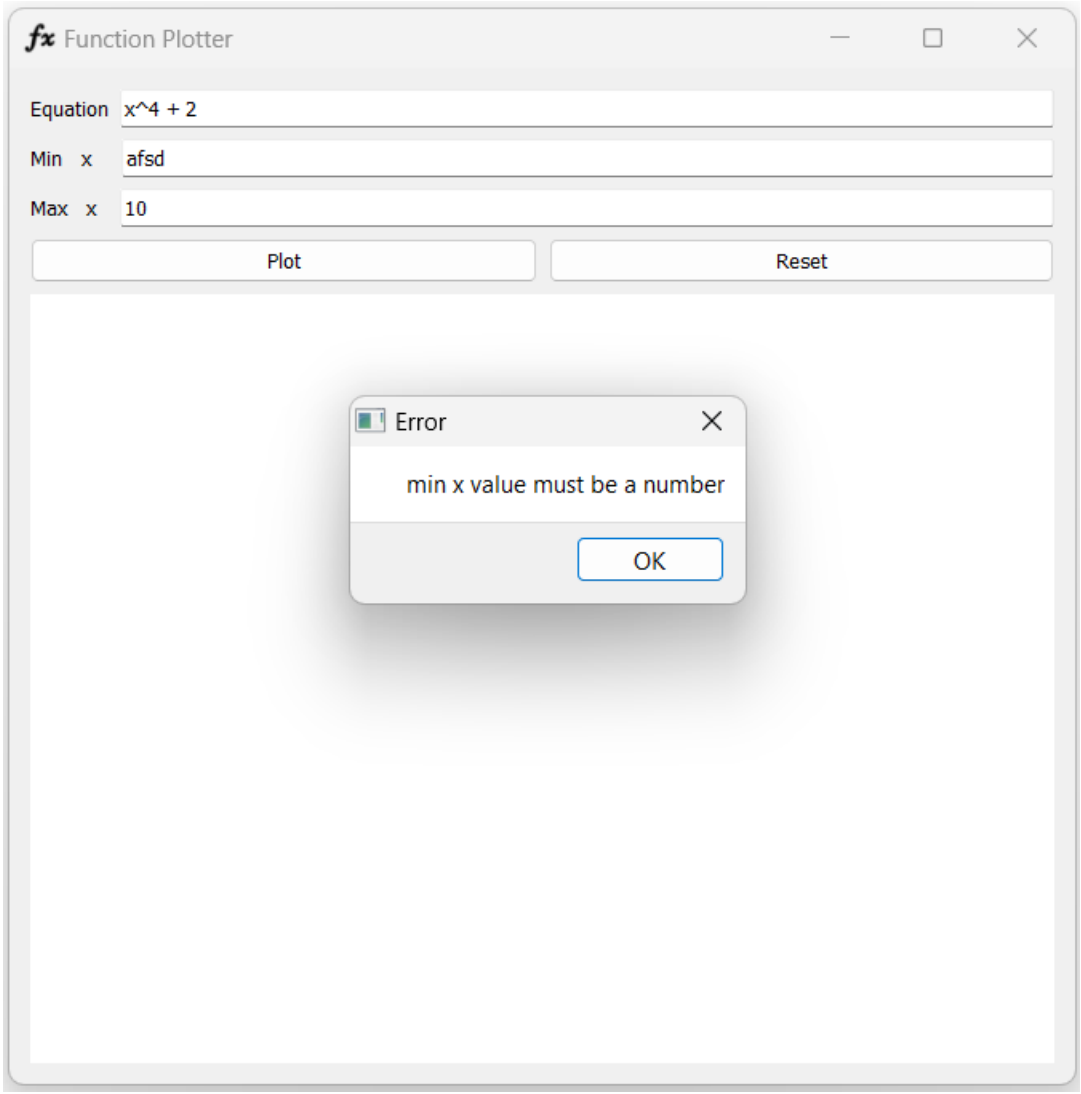

Function Plotter
Equation
x + 4
Min x
-5
Max x
-10
Plot
Reset
Error
max x value must be greater than min x value
OK

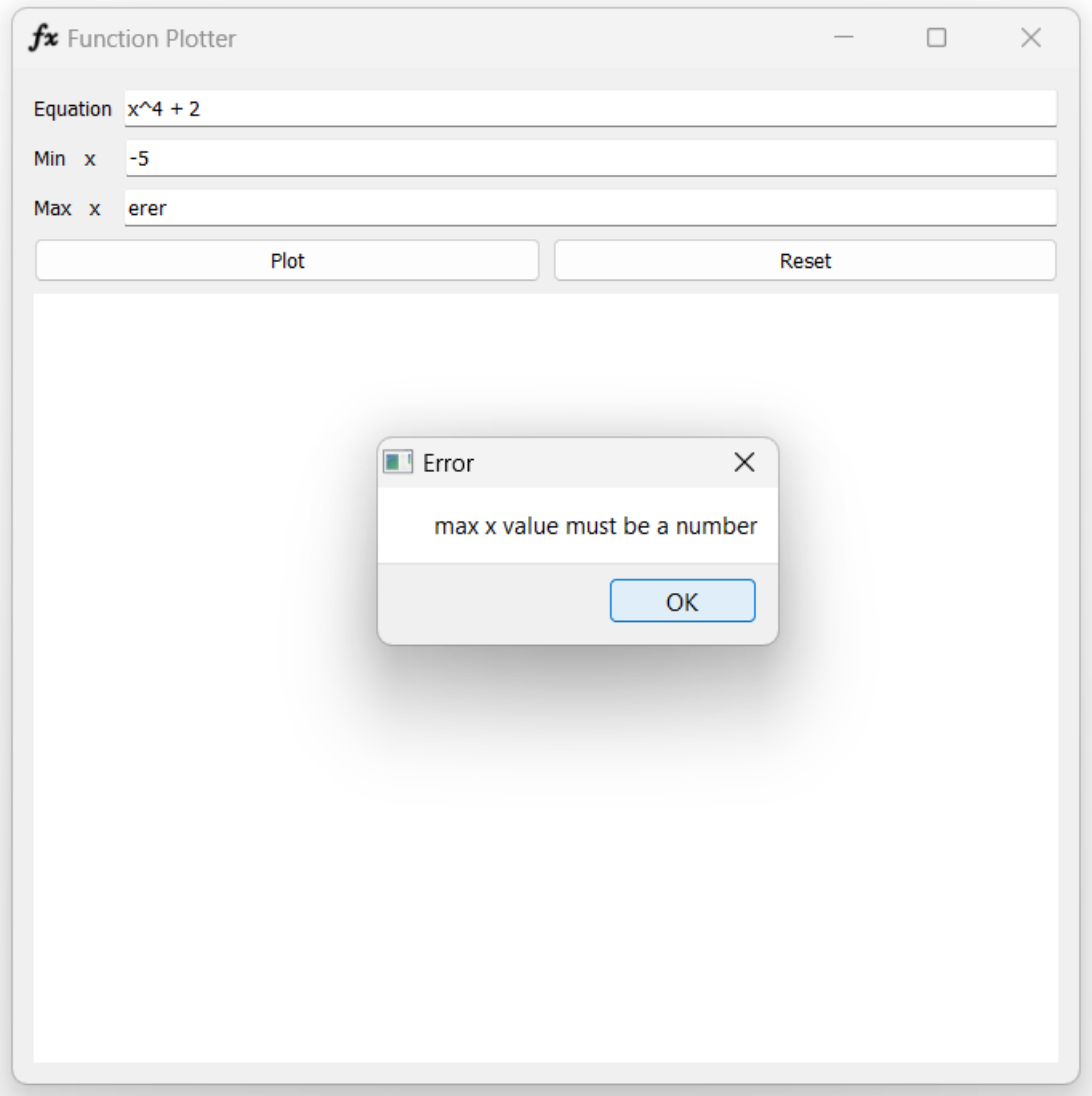

Function Plotter
Equation
x + 4
Min x
Max x
Plot
Reset
Error
Please enter min x
OK

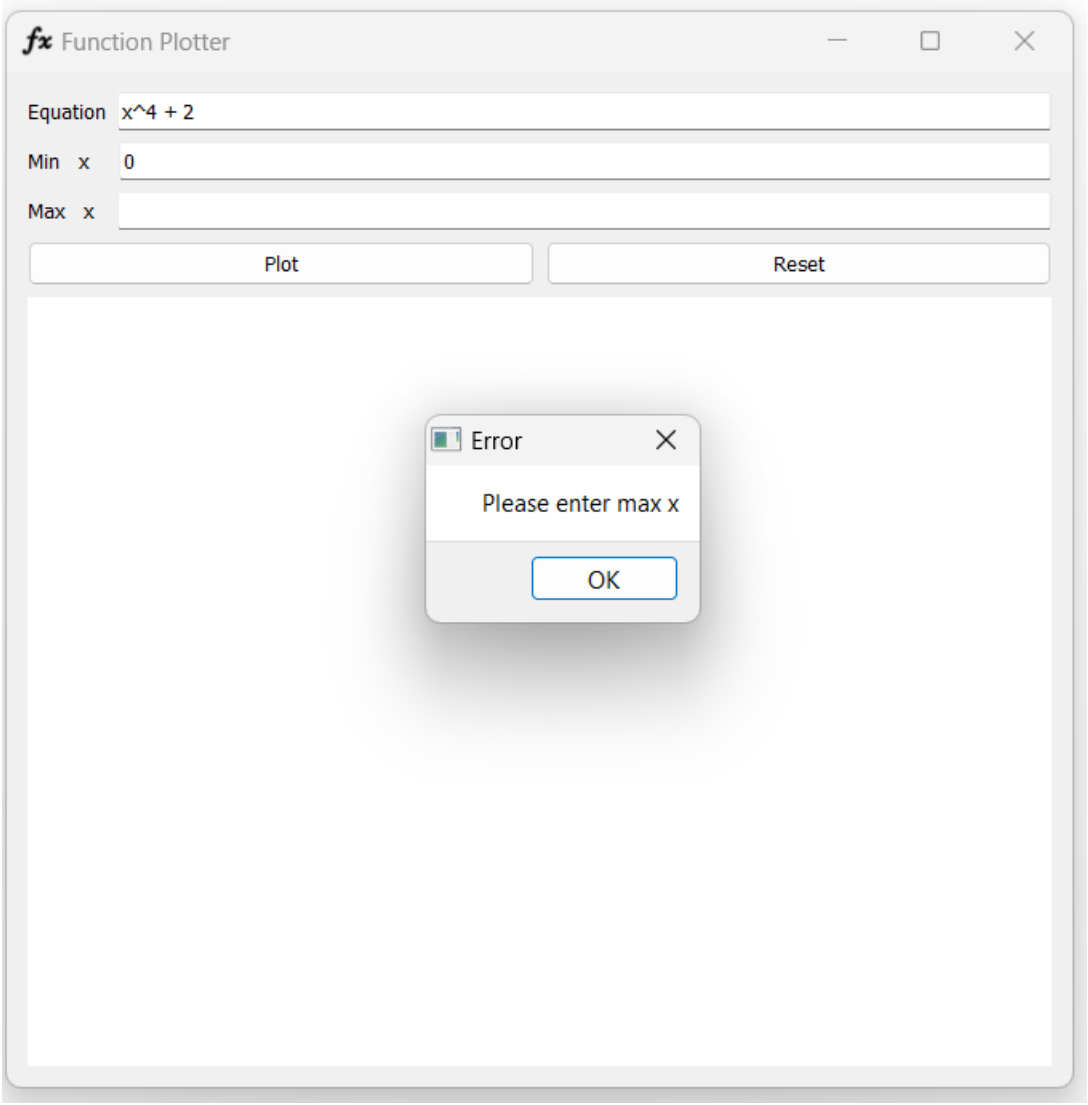

Function Plotter
Equation
x & 4
Min x
Max x
Plot
Reset
Error
Invalid function
OK

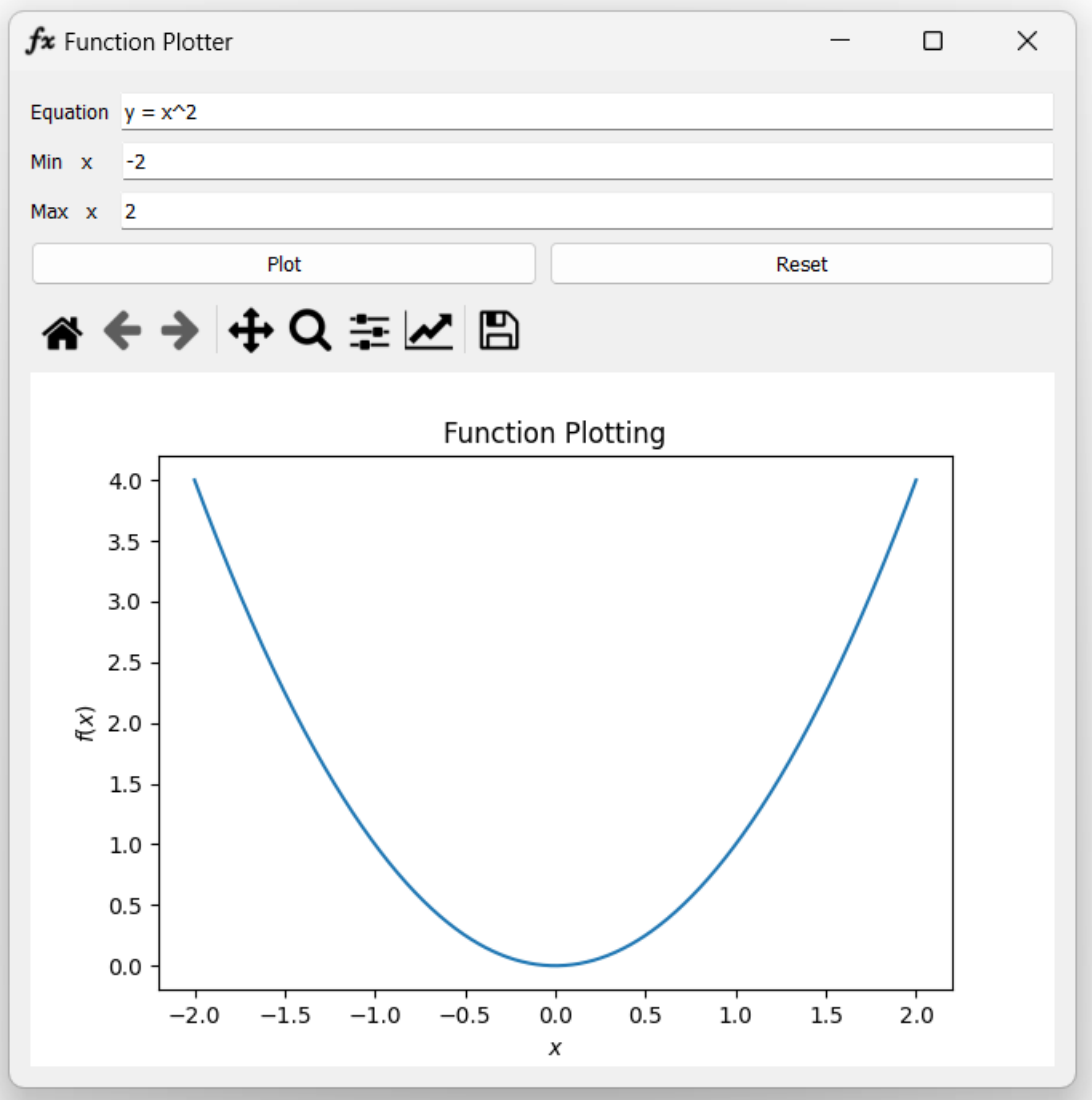

Function Plotter
Equation
x^y
Min x
Max x
Plot
Reset
Error
Invalid function
OK

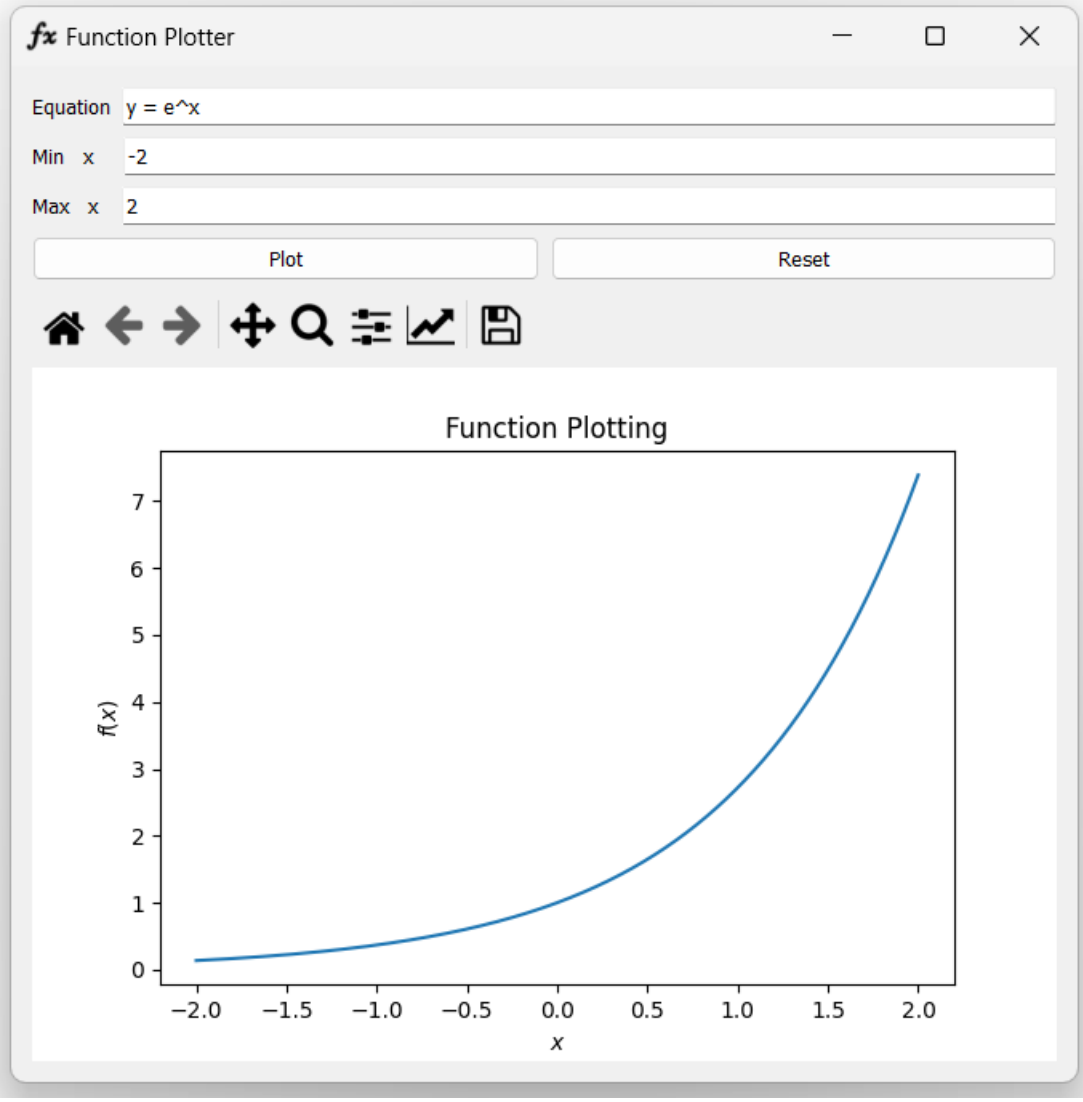

Function Plotter
Equation
x^4 + 2
Min x
Max x
10
Plot
Reset
Error
Please enter min x
OK

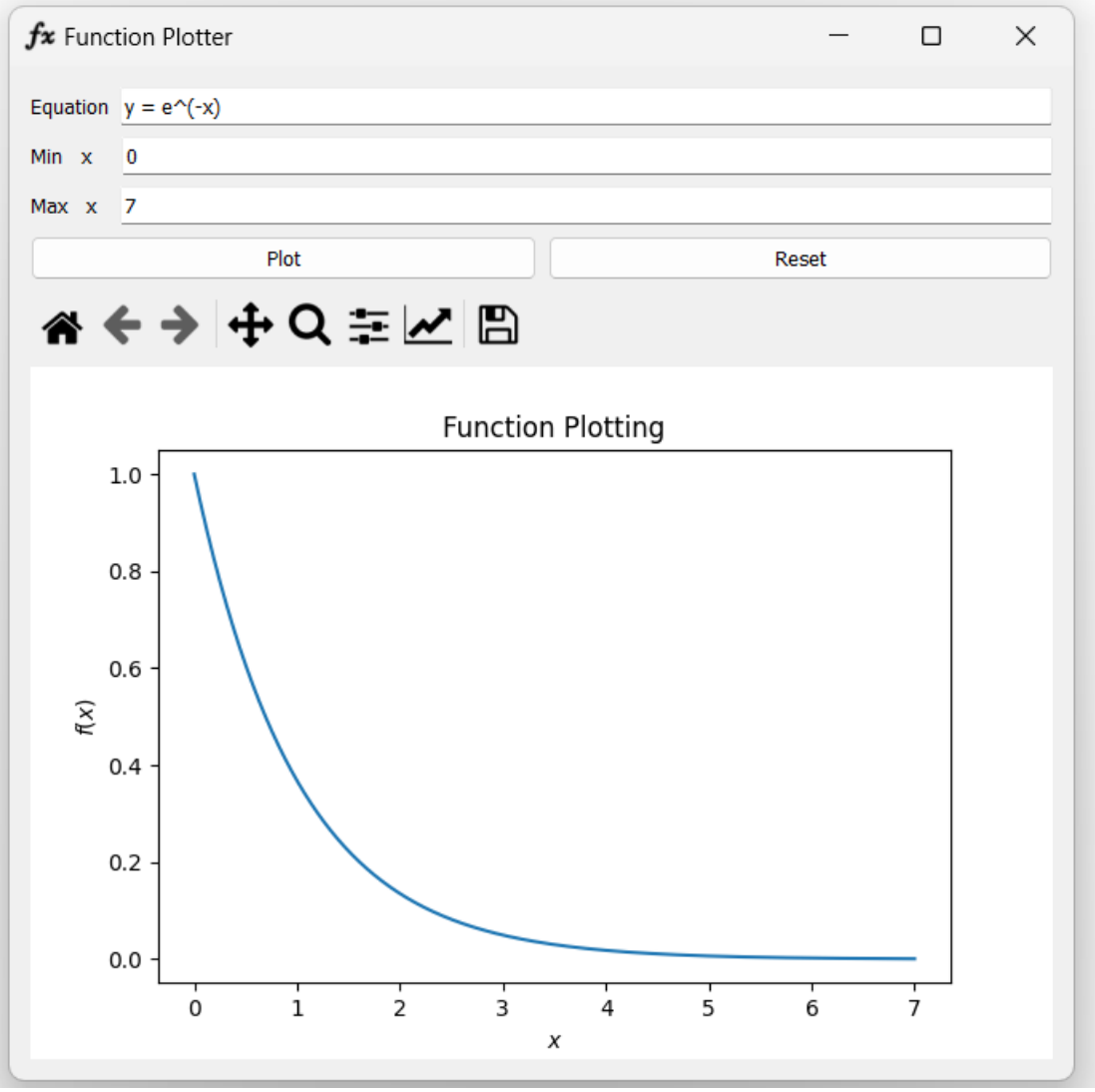

Function Plotter
Equation
x^4 + 2
Min x
afsd
Max x
10
Plot
Reset
Error
min x value must be a number
OK

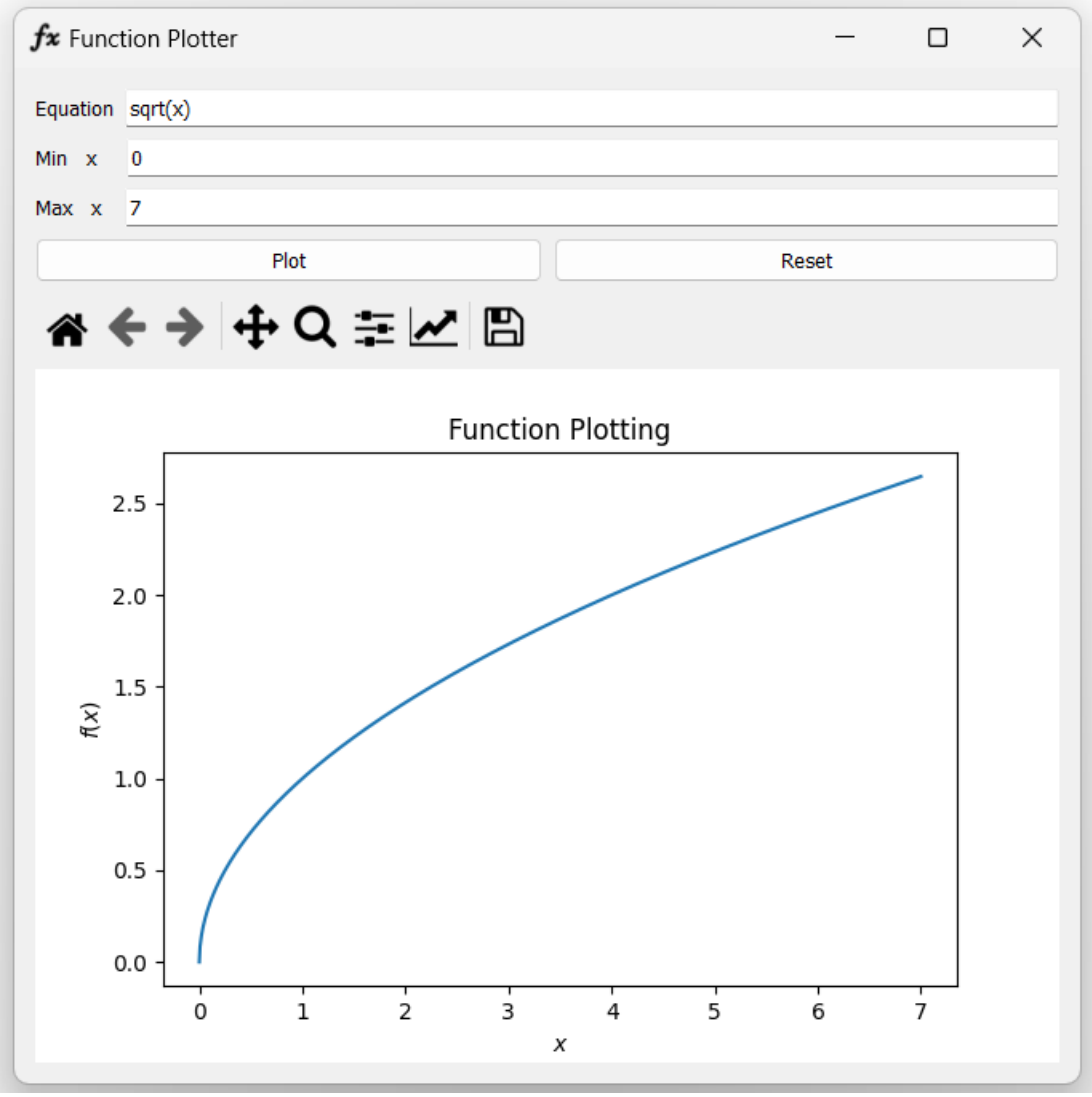

Function Plotter
Equation
x^4 + 2
Min x
-5
Max x
erer
Plot
Reset
Error
max x value must be a number
OK

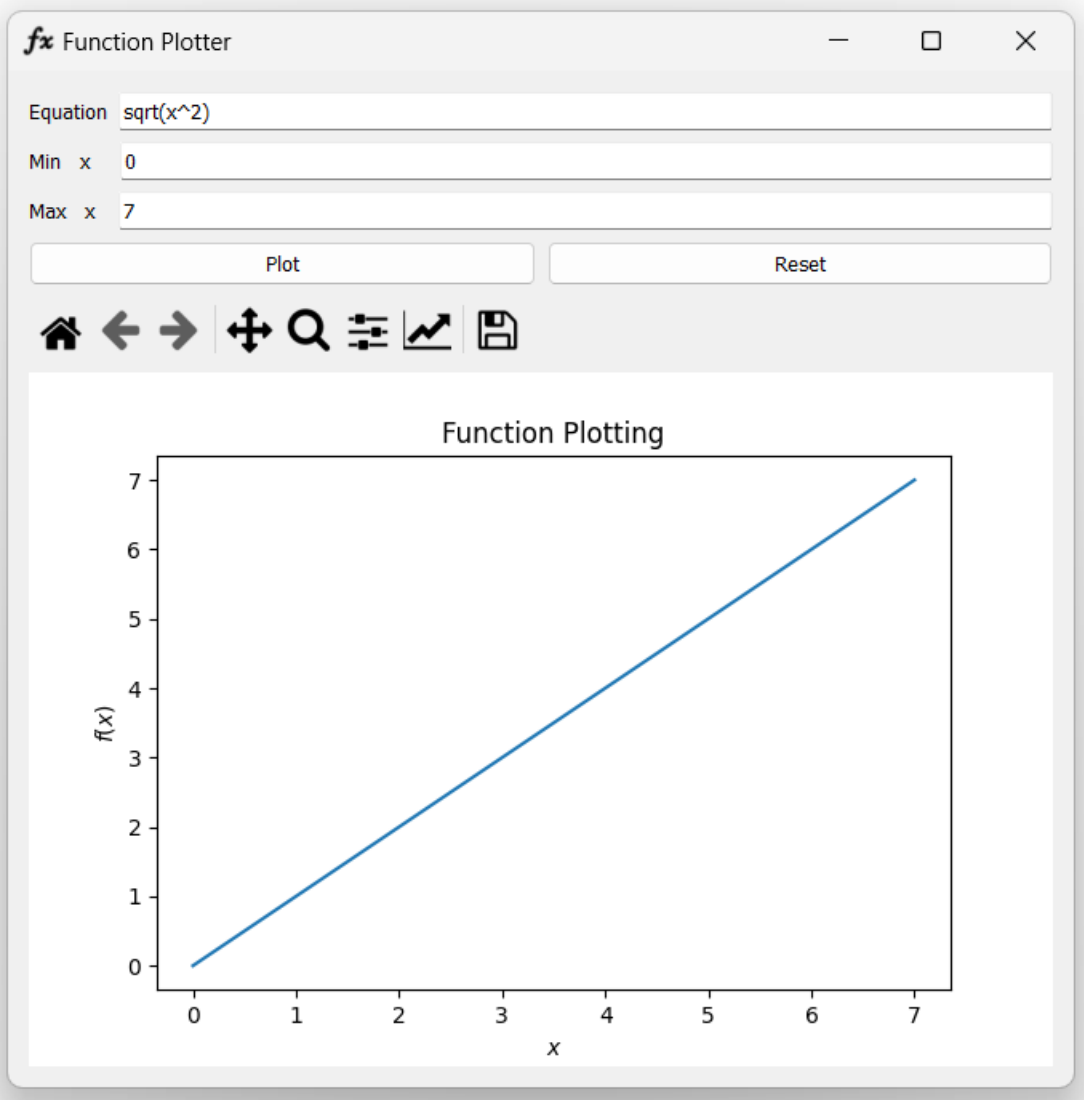

Function Plotter
Equation
x^4 + 2
Min x
0
Max x
Plot
Reset
Error
Please enter max x
OK

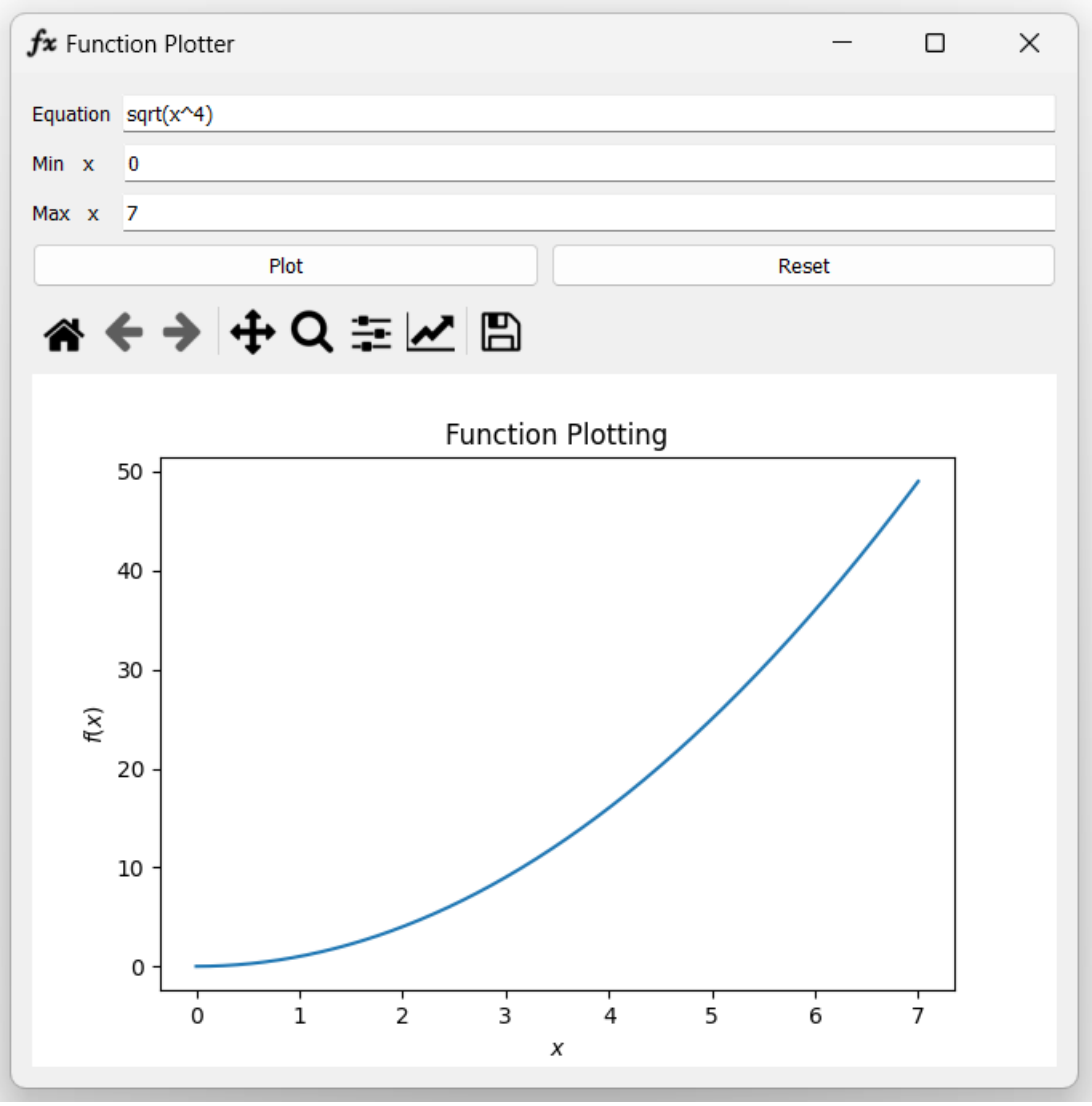

Function Plotter
Equation
y = x^2
Min x
-2
Max x
2
Plot
Reset
Function Plotting
f(x)
x
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

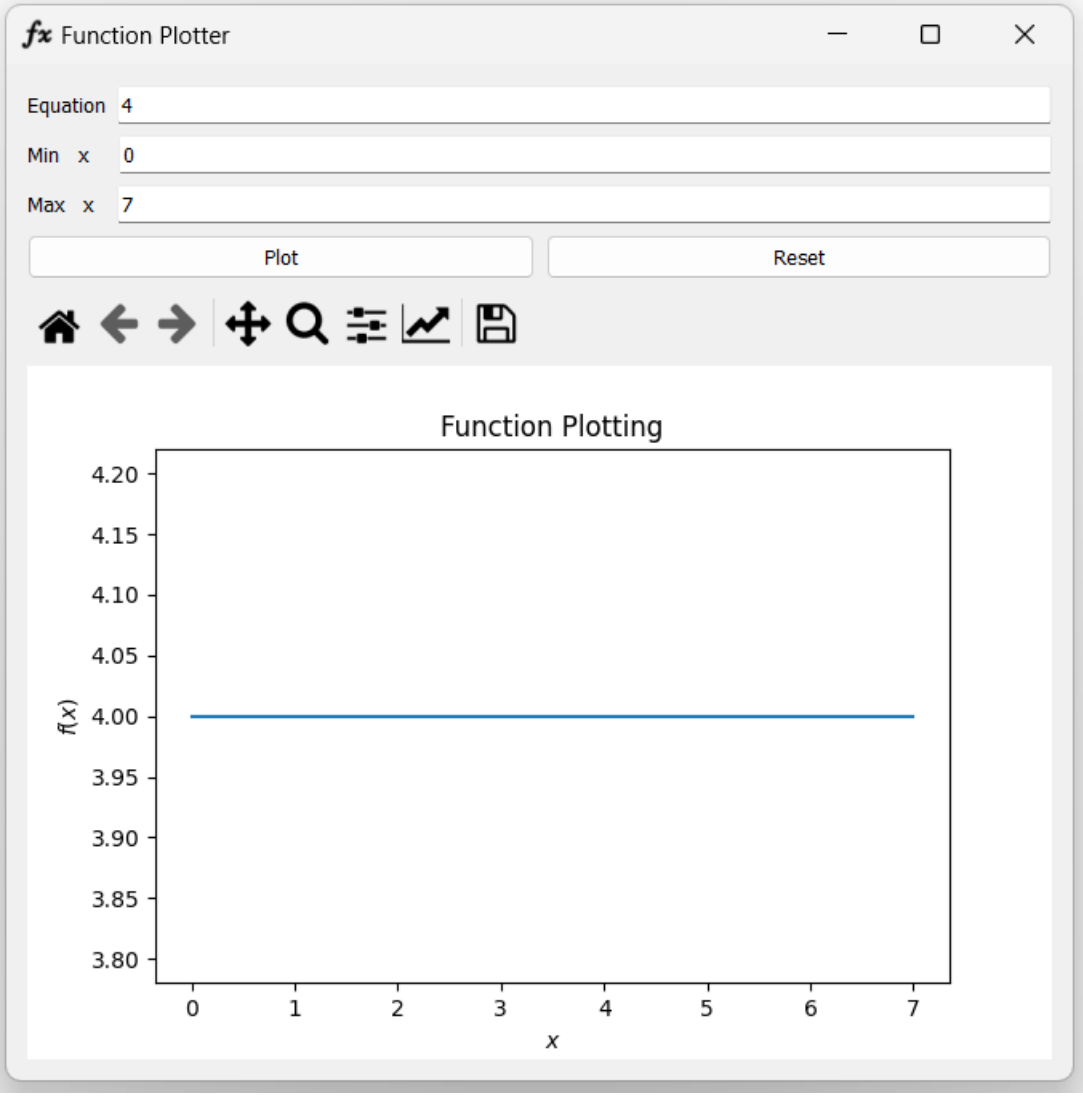

Function Plotter
Equation
y = e^x
Min x
-2
Max x
2
Plot
Reset
Function Plotting
f(x)
x
0
1
2
3
4
5
6
7
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

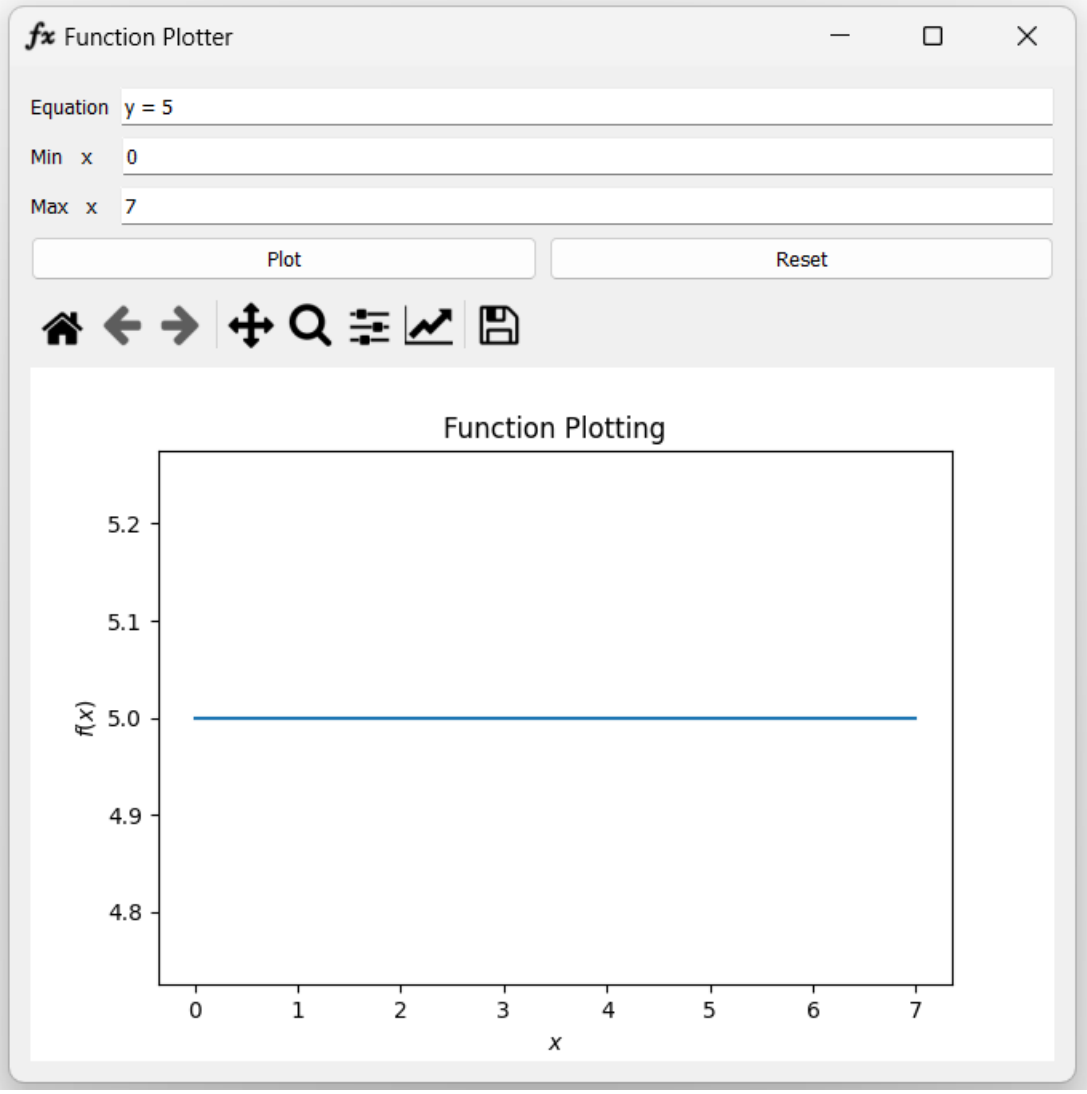

Function Plotter
Equation
y = e^(-x)
Min x
0
Max x
7
Plot
Reset
Function Plotting
1.0
0.8
0.6
0.4
0.2
0.0
f(x)
0
1
2
3
4
5
6
7
x

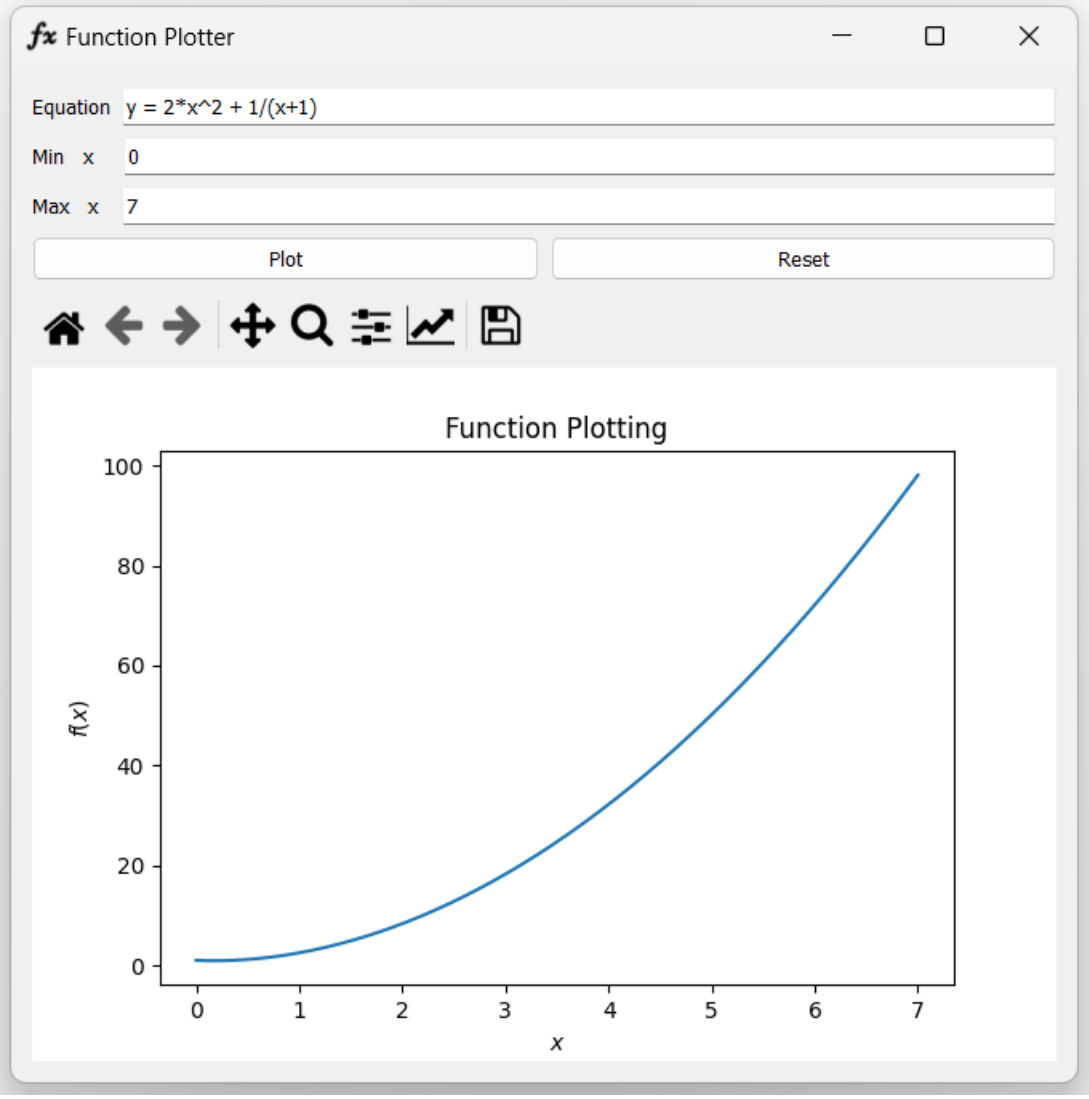

Function Plotter
Equation
sqrt(x)
Min x
0
Max x
7
Plot
Reset
Function Plotting
f(x)
x
0.0
0.5
1.0
1.5
2.0
2.5
0
1
2
3
4
5
6
7

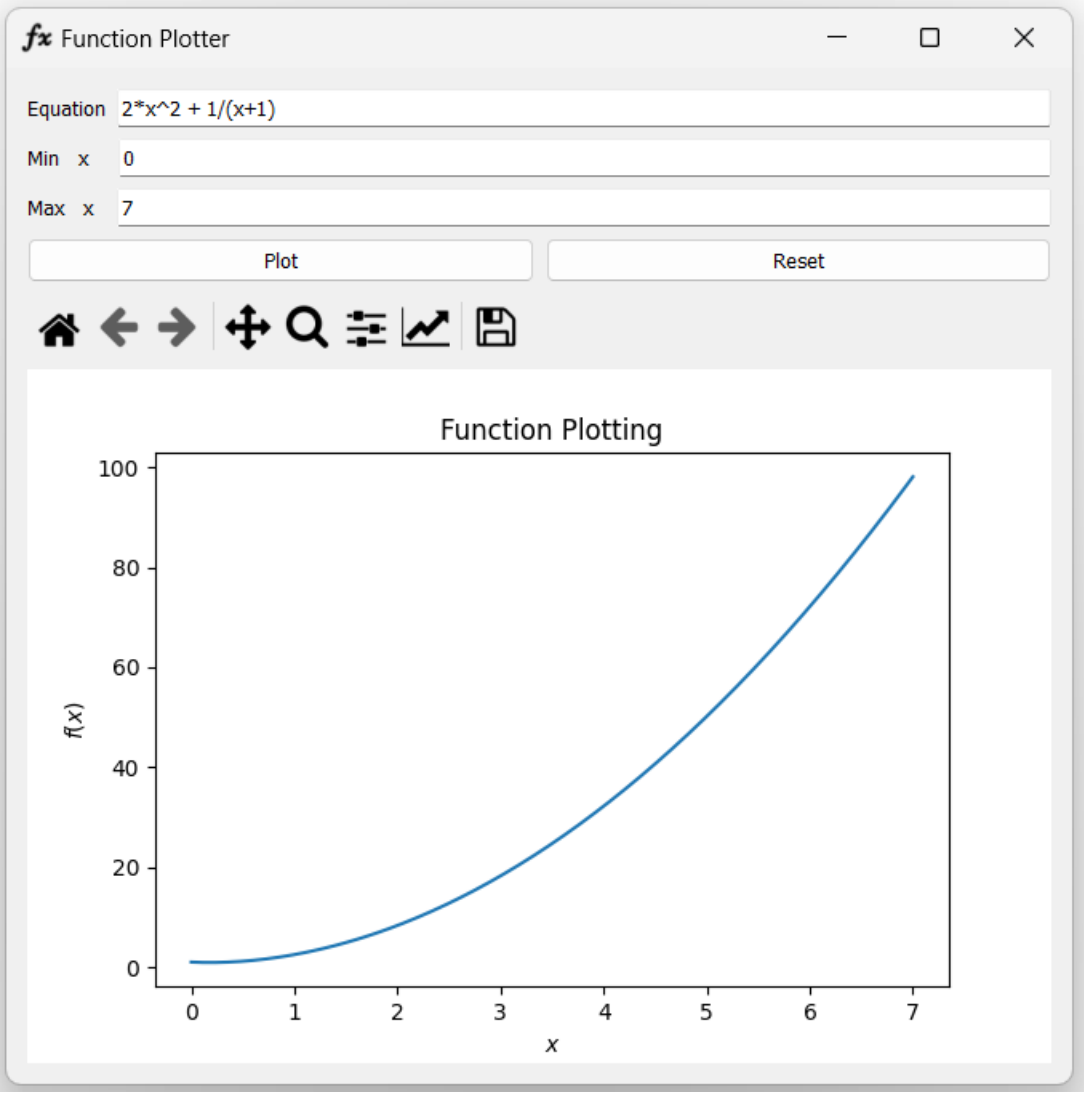

Function Plotter
Equation
sqrt(x^2)
Min x
0
Max x
7
Plot
Reset
Function Plotting
f(x)
x
0
1
2
3
4
5
6
7

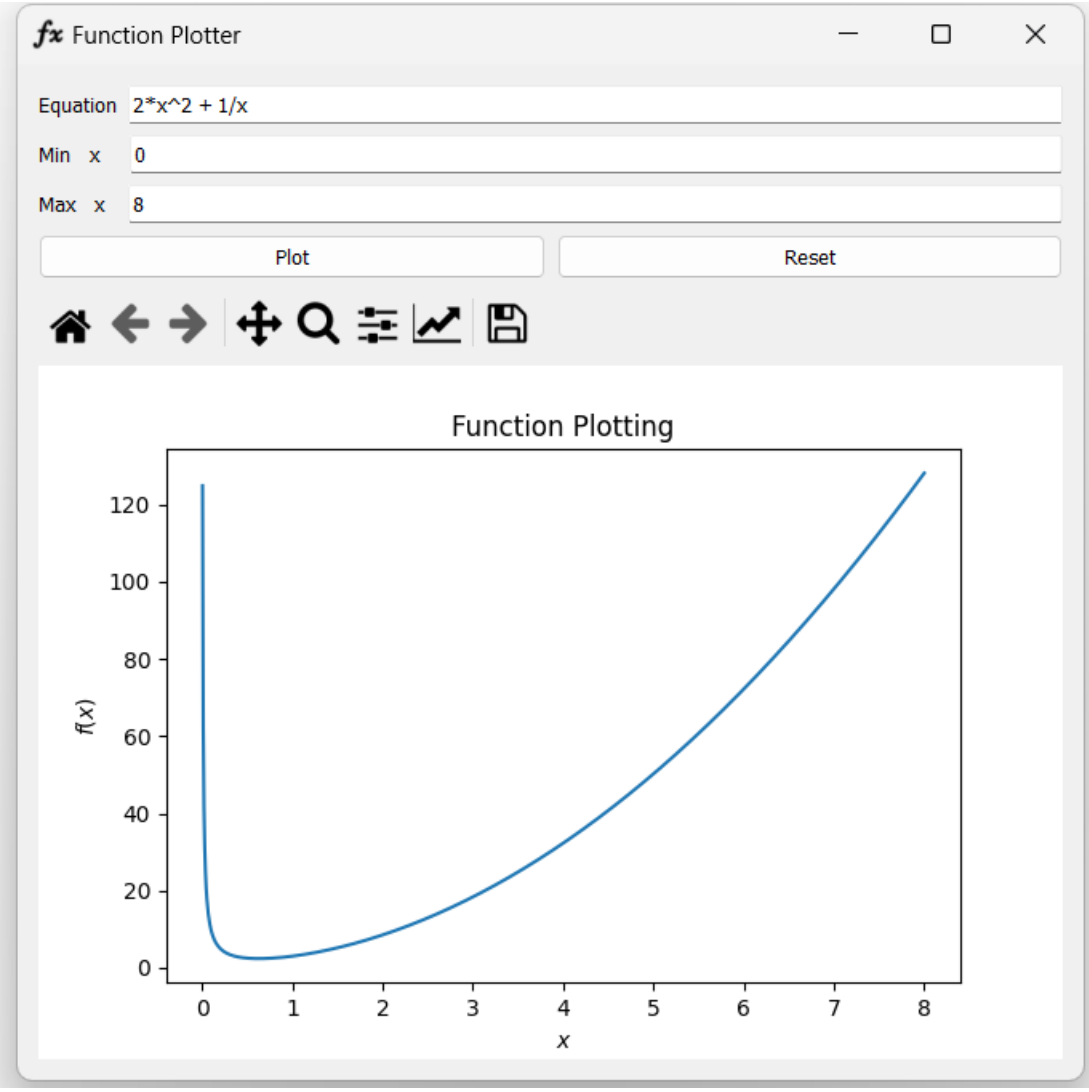

Function Plotter
Equation
sqrt(x^4)
Min x
0
Max x
7
Plot
Reset
Function Plotting
50
40
30
20
10
0
f(x)
0
1
2
3
4
5
6
7
x

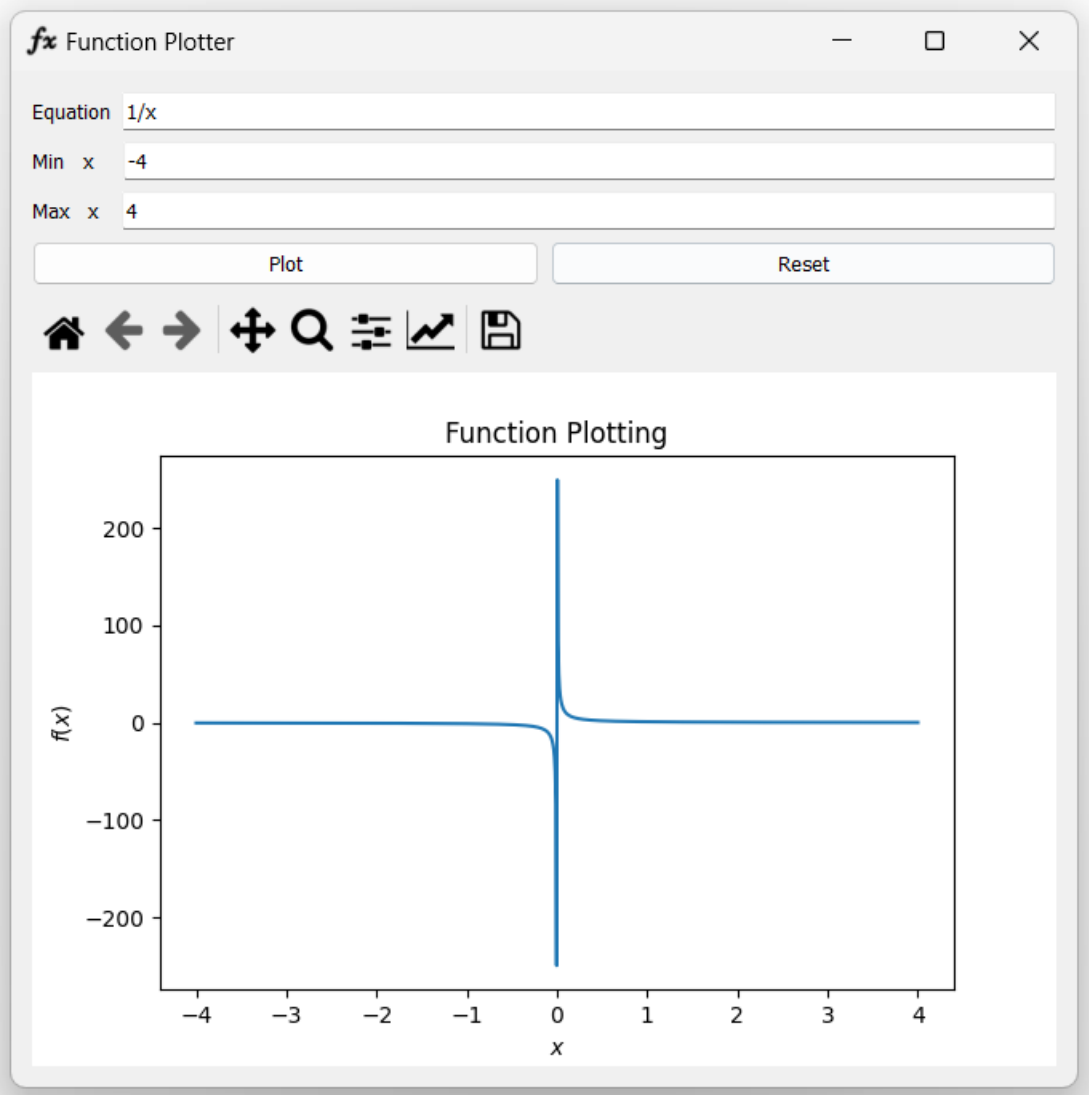

Function Plotter
Equation 4
Min x 0
Max x 7
Plot
Reset
Function Plotting
4.20
4.15
4.10
4.05
4.00
3.95
3.90
3.85
3.80
f(x)
0
1
2
3
4
5
6
7
x

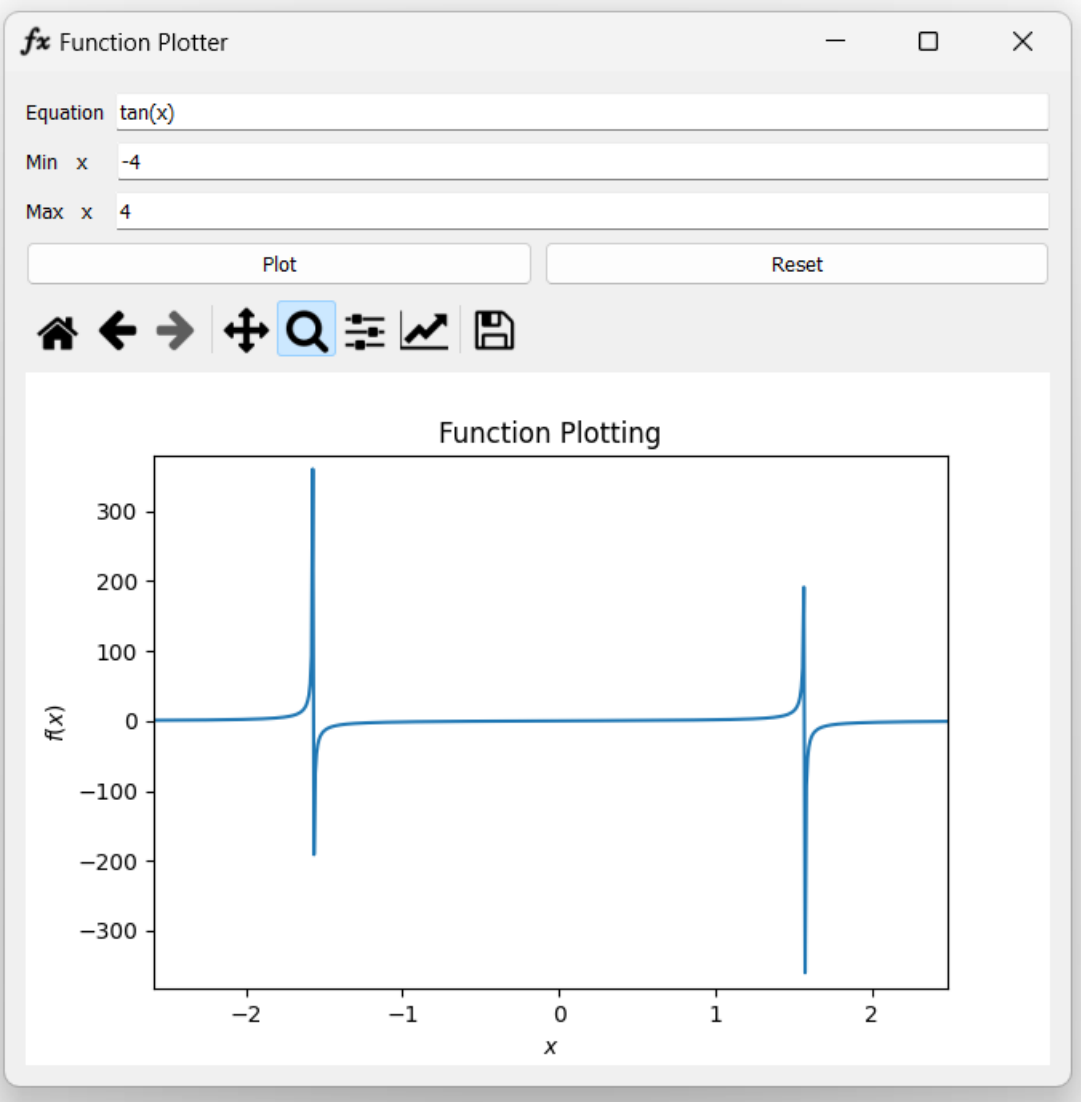

Function Plotter
Equation
y = 5
Min x
0
Max x
7
Plot
Reset
Function Plotting
5.2
5.1
5.0
4.9
4.8
f(x)
0
1
2
3
4
5
6
7
x

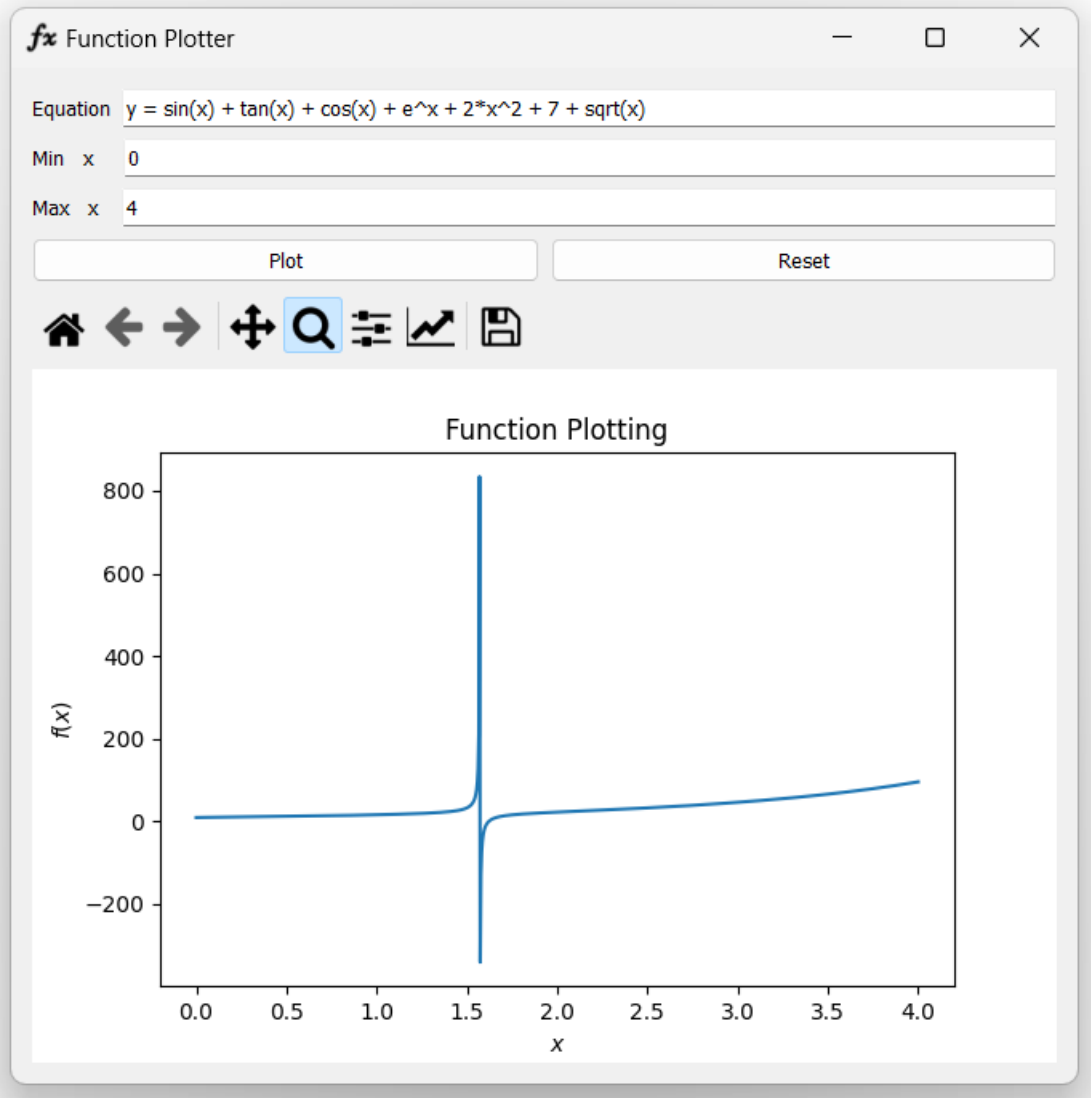

Function Plotter
Equation
y = 2*x^2 + 1/(x+1)
Min x
0
Max x
7
Plot
Reset
Function Plotting
100
80
60
40
20
0
f(x)
0
1
2
3
4
5
6
7
x

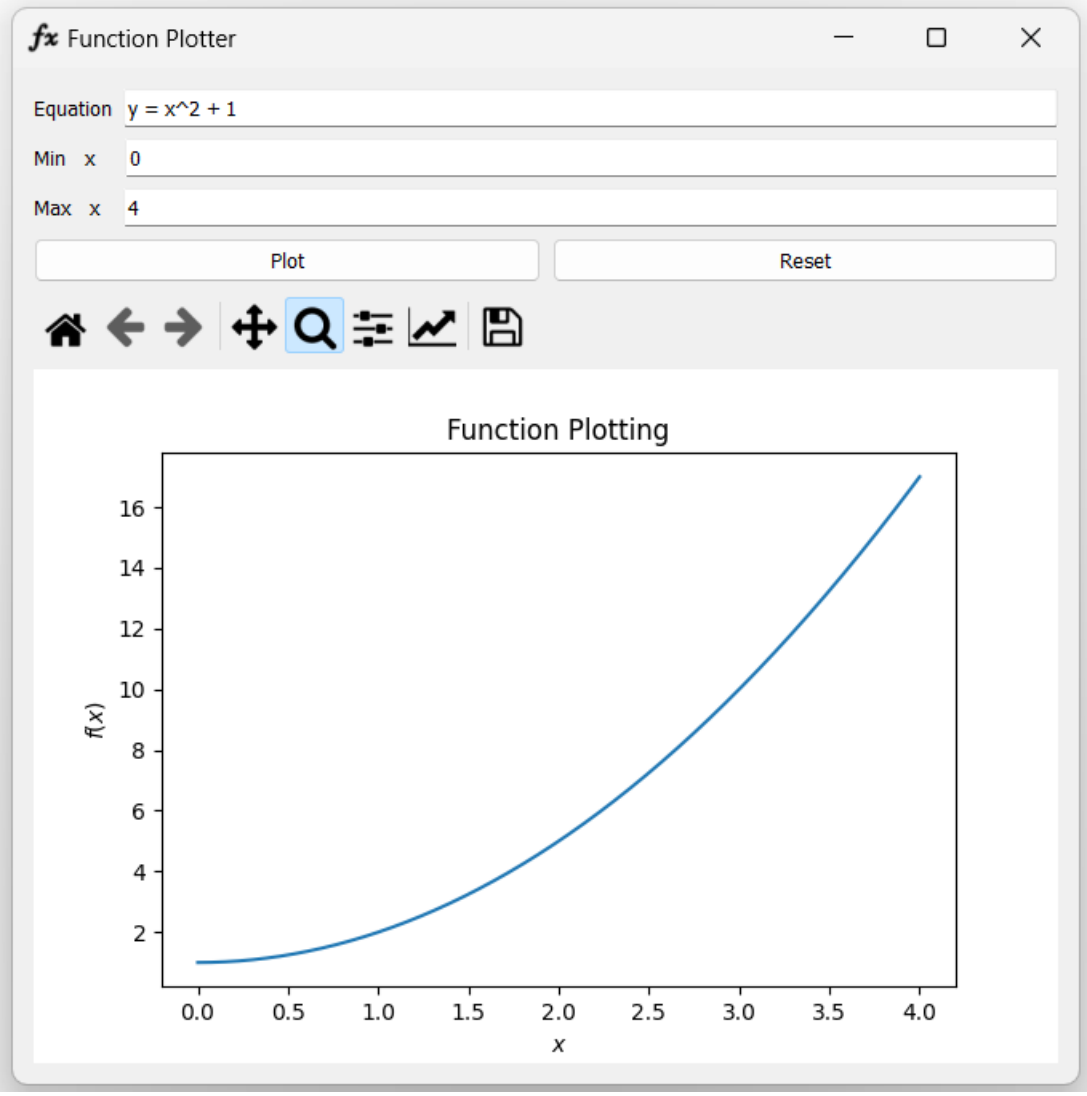

Function Plotter
Equation
2*x^2 + 1/(x+1)
Min x
0
Max x
7
Plot
Reset
Function Plotting
100
80
60
40
20
0
f(x)
0
1
2
3
4
5
6
7
x


Function Plotter
Equation
2*x^2 + 1/x
Min x
0
Max x
8
Plot
Reset
Function Plotting
f(x)
x
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8

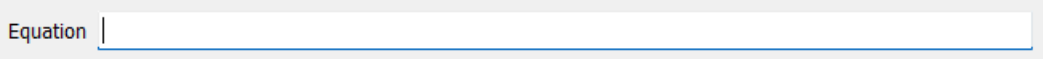

Function Plotter
Equation 1/x
Min x -4
Max x 4
Plot
Reset
Function Plotting
200
100
0
−100
−200
f(x)
−4
−3
−2
−1
0
1
2
3
4
x


Function Plotter
Equation
tan(x)
Min x
-4
Max x
4
Plot
Reset
Function Plotting
300
200
100
0
−100
−200
−300
f(x)
−2
−1
0
1
2
x

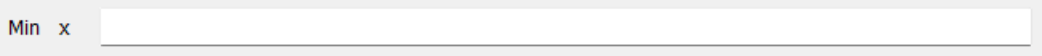

Function Plotter
Equation
y = sin(x) + tan(x) + cos(x) + e^x + 2*x^2 + 7 + sqrt(x)
Min x
0
Max x
4
Plot
Reset
Function Plotting
800
600
400
200
0
−200
f(x)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
x


Function Plotter
Equation
y = x^2 + 1
Min x
0
Max x
4
Plot
Reset
Function Plotting
f(x)
x
16
14
12
10
8
6
4
2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0

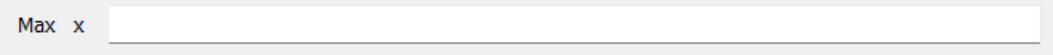
Buttons and Textbooks, Toolbars, and Figure



This textbook is used to enter function by the user.



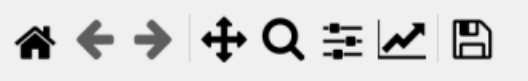
This textbook is used to enter min value for x by the user.



This textbook is used to enter max value for x by the user.

This button is used to plot the function entered by the user.

This button is used to clear data entered by user and the plot.



This toolbar is used to

- zoom in and out of the plot by selecting a rectangular region with the mouse.
- move the plot around by dragging with the mouse.
- select a subplot to focus on.
- save the plot to a file in various formats, such as PNG, PDF, SVG, or EPS.
- navigate back and forward through the plot history.
- resets the plot to its original view.
- scales the plot to fit within the window or to show the entire plot.
- displays the x and y coordinates of the mouse cursor on the plot.

Requirements

- App Requirements

  ```
  pip install PySide2
  pip install numpy
  pip install matplotlib
  ```

- Testing Requirements

  ```
  pip install pytest
  pip install pytest-qt
  ```

Usage

- Run Plotter.py file.

  ```
  python Plotter.py
  ```

- In case of testing, run test.py file.

  ```
  pytest test.py
  ```