



МИЭТ

Национальный исследовательский университет «МИЭТ»

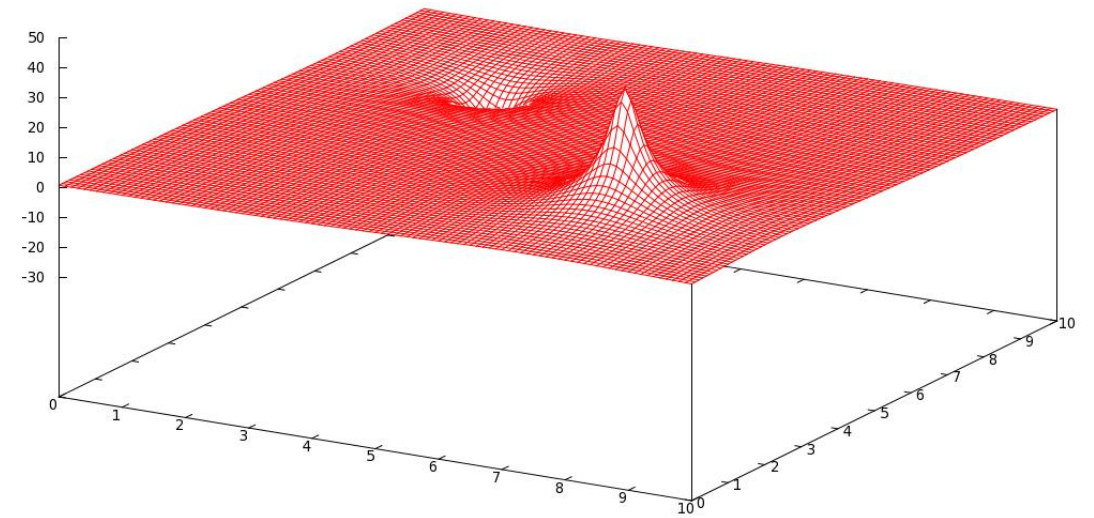
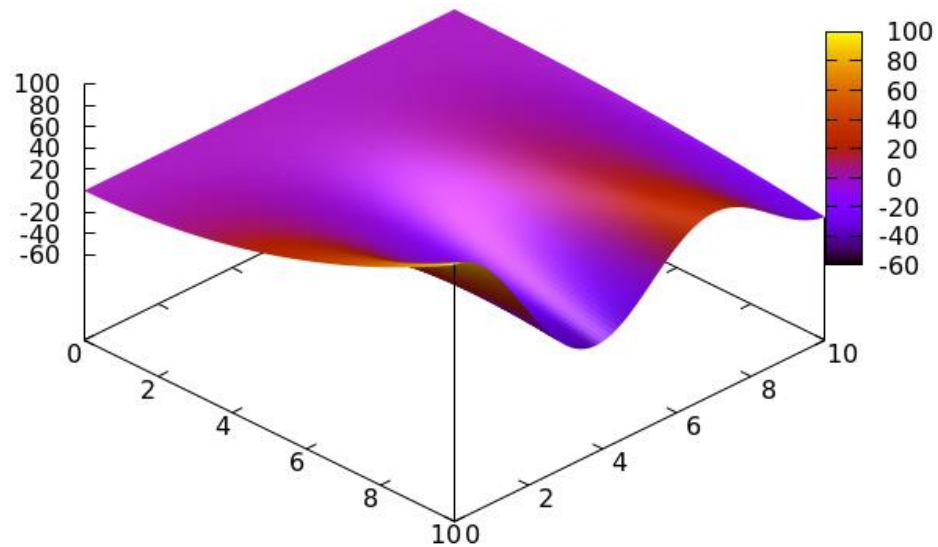
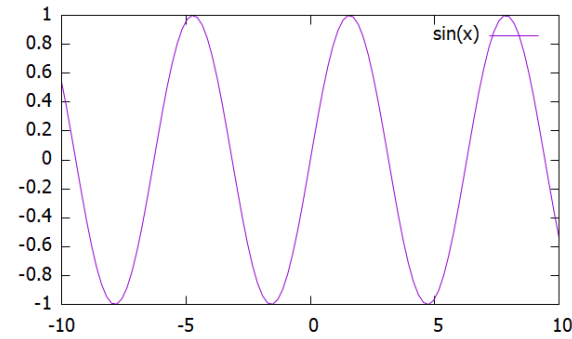
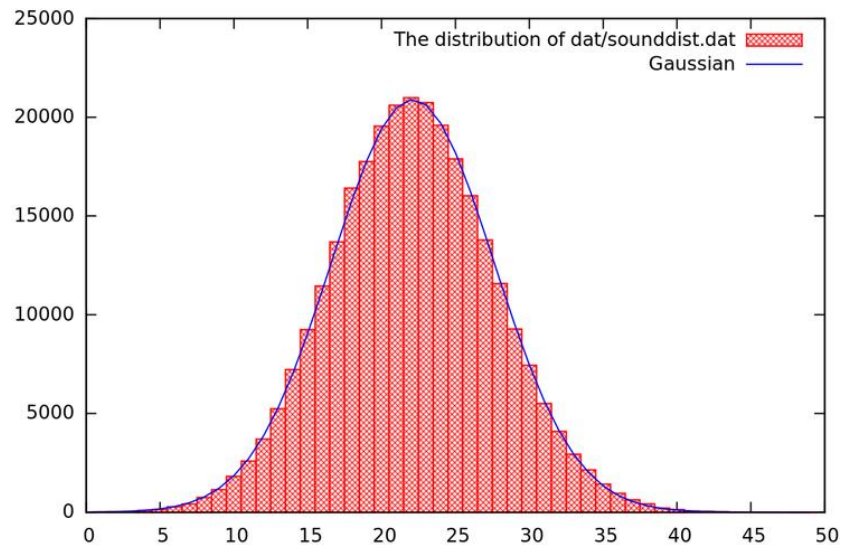
Кафедра ПКИМС

Компьютерные технологии в научных исследованиях

Семинар №6

Работа с пакетом `gnuplot`

Задача визуализации графиков



Запуск программы gnuplot



gnuplot.exe

```
D:\gnuplot\bin\gnuplot.exe

GNU PLOT
Version 6.1 patchlevel 0   last modified 2023-03-14

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Thomas Williams, Colin Kelley and many others

gnuplot home:      http://www.gnuplot.info
mailing list:     gnuplot-beta@lists.sourceforge.net
faq, bugs, etc:   type "help FAQ"
immediate help:   type "help" (plot window: hit 'h')

Terminal type is now 'qt'
Encoding set to 'cp1251'.
gnuplot>
```



wgnuplot.exe

```
gnuplot

File Plot Expressions Functions General Axes Chart Styles 3D Help

GNU PLOT
Version 6.1 patchlevel 0   last modified 2023-03-14

Copyright (C) 1986-1993, 1998, 2004, 2007-2023
Thomas Williams, Colin Kelley and many others

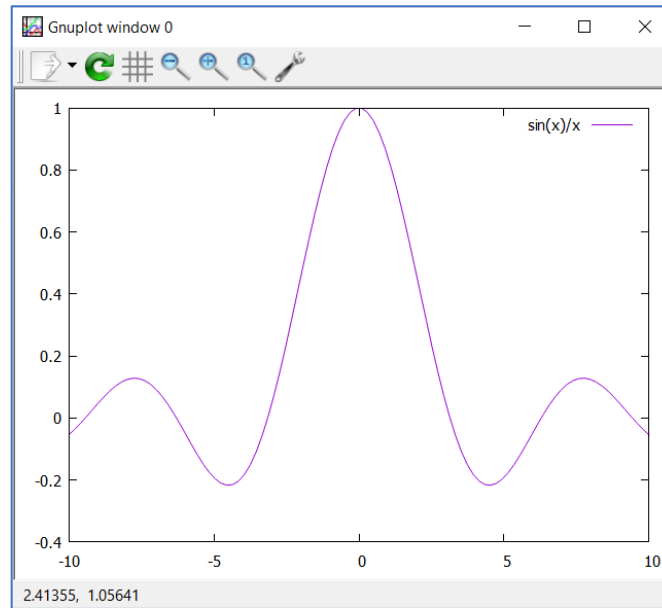
gnuplot home:      http://www.gnuplot.info
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faq, bugs, etc:   type "help FAQ"
immediate help:   type "help" (plot window: hit 'h')

Terminal type is now 'qt'
gnuplot>
```

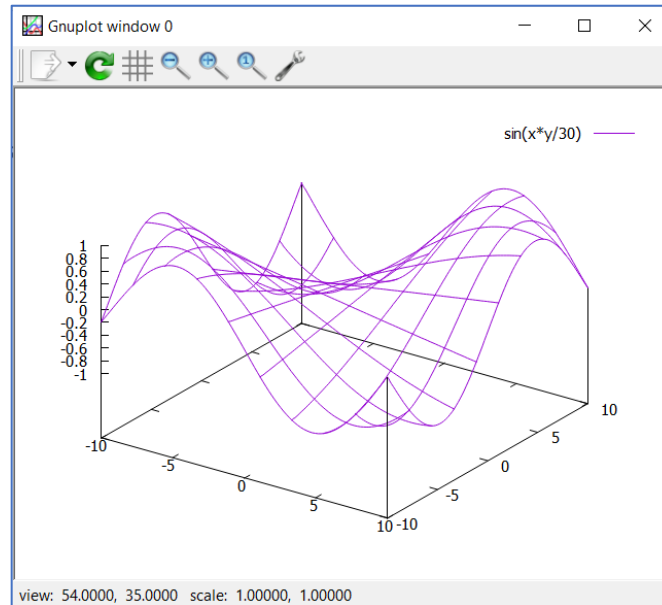
encoding: cp1251

Построение простого 2D и 3D-графика

> plot sin(x)/x

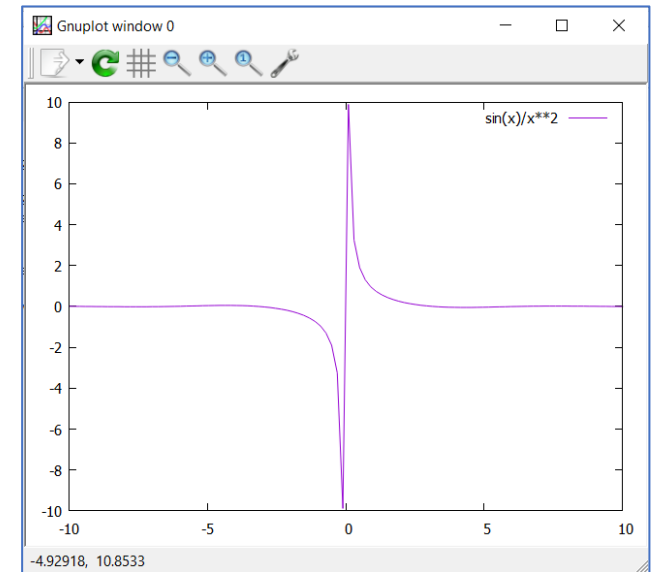
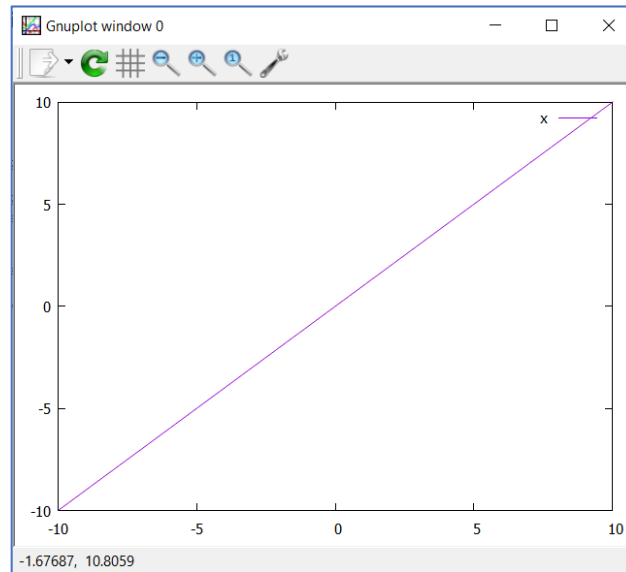
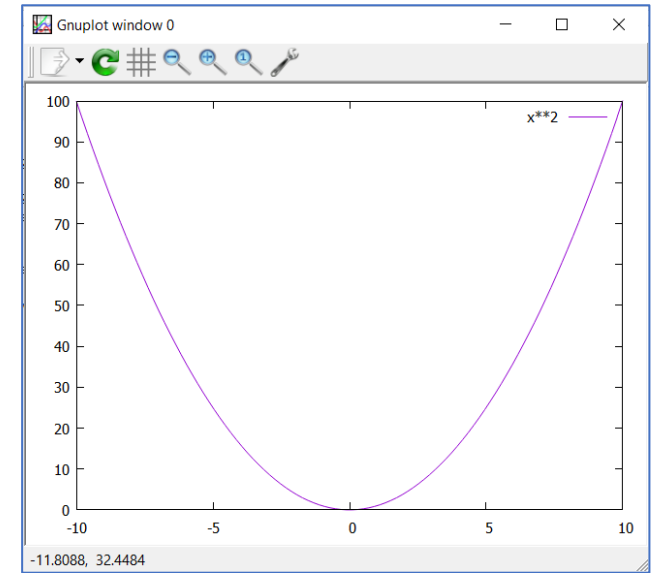
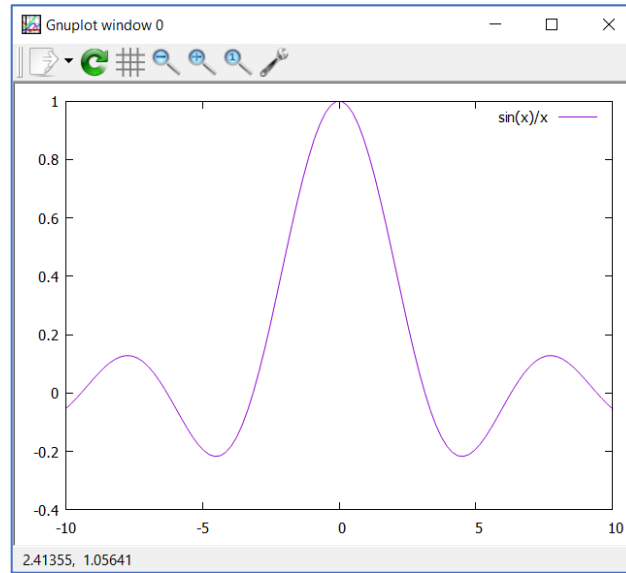


> splot sin(x*y/30)



Построение 2D-графиков

- > `plot sin(x)/x`
- > `plot x**2`
- > `plot x`
- > `plot sin(x)/x**2`



Поддерживаемые функции

<code>abs(x)</code>	absolute value of x , $ x $
<code>acos(x)</code>	arc-cosine of x
<code>asin(x)</code>	arc-sine of x
<code>atan(x)</code>	arc-tangent of x
<code>cos(x)</code>	cosine of x , x is in radians.
<code>cosh(x)</code>	hyperbolic cosine of x , x is in radians
<code>erf(x)</code>	error function of x
<code>exp(x)</code>	exponential function of x , base e
<code>inverf(x)</code>	inverse error function of x
<code>invnorm(x)</code>	inverse normal distribution of x
<code>log(x)</code>	log of x , base e
<code>log10(x)</code>	log of x , base 10
<code>norm(x)</code>	normal Gaussian distribution function
<code>rand(x)</code>	pseudo-random number generator
<code>sgn(x)</code>	1 if $x > 0$, -1 if $x < 0$, 0 if $x=0$
<code>sin(x)</code>	sine of x , x is in radians
<code>sinh(x)</code>	hyperbolic sine of x , x is in radians
<code>sqrt(x)</code>	the square root of x
<code>tan(x)</code>	tangent of x , x is in radians
<code>tanh(x)</code>	hyperbolic tangent of x , x is in radians

Управление диапазоном значений

```
> plot sin(x)/x
```

```
> plot [-5:5] sin(x)/x
```

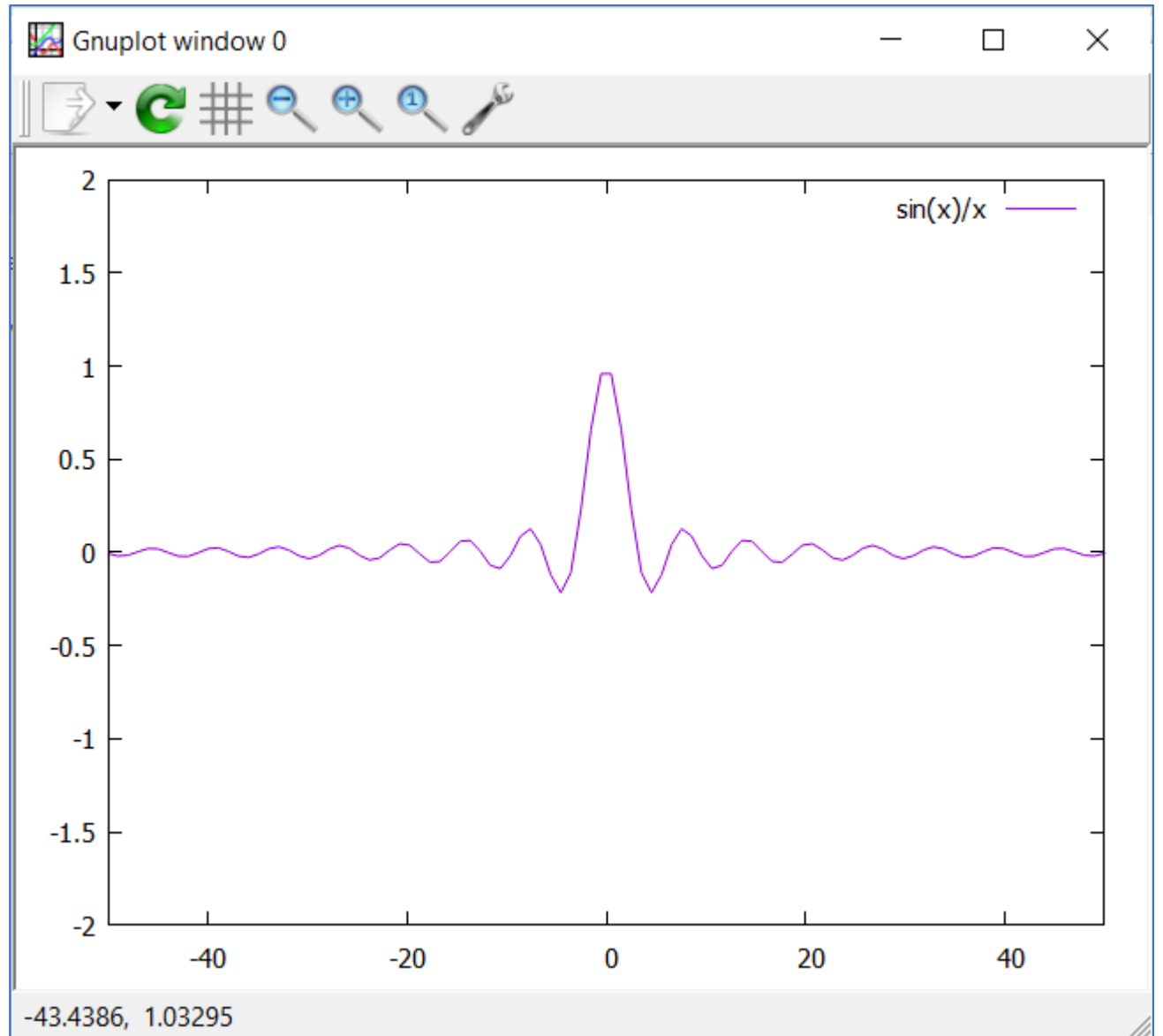
```
> plot [-5:5] [-10:10] sin(x)/x
```

```
> plot [] [-10:10] sin(x)/x
```

```
> set xrange [-50:50]
```

```
> set yrange [-2:2]
```

```
> plot sin(x)/x
```

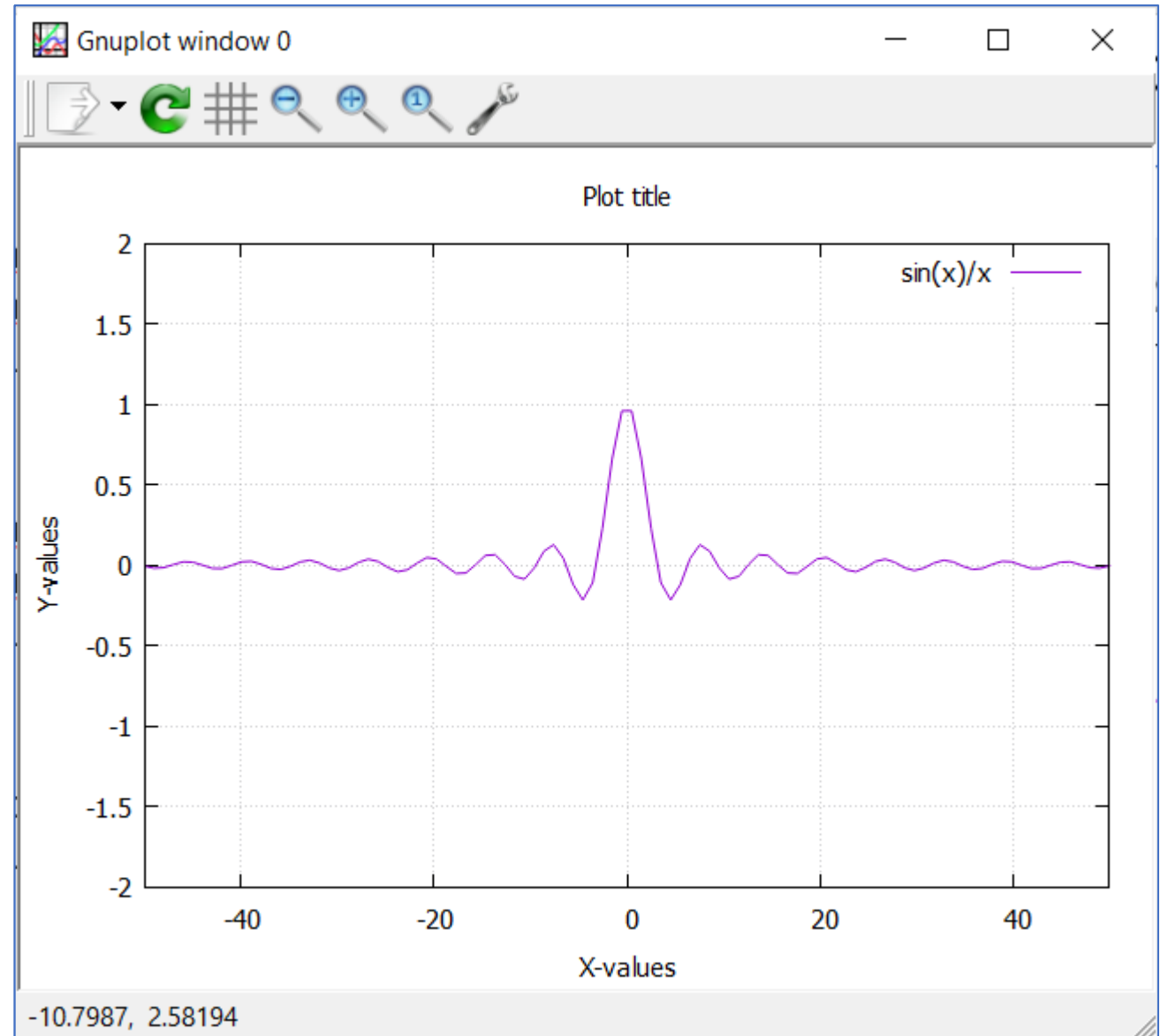


Управление текстовой информацией (1)

```
> set xrange [-50:50]  
> set yrange [-2:2]  
> plot sin(x)/x
```

```
> set xlabel "X-values"  
> set ylabel "Y-values"  
> plot sin(x)/x
```

```
> set title "Plot title"  
> plot sin(x)/x
```

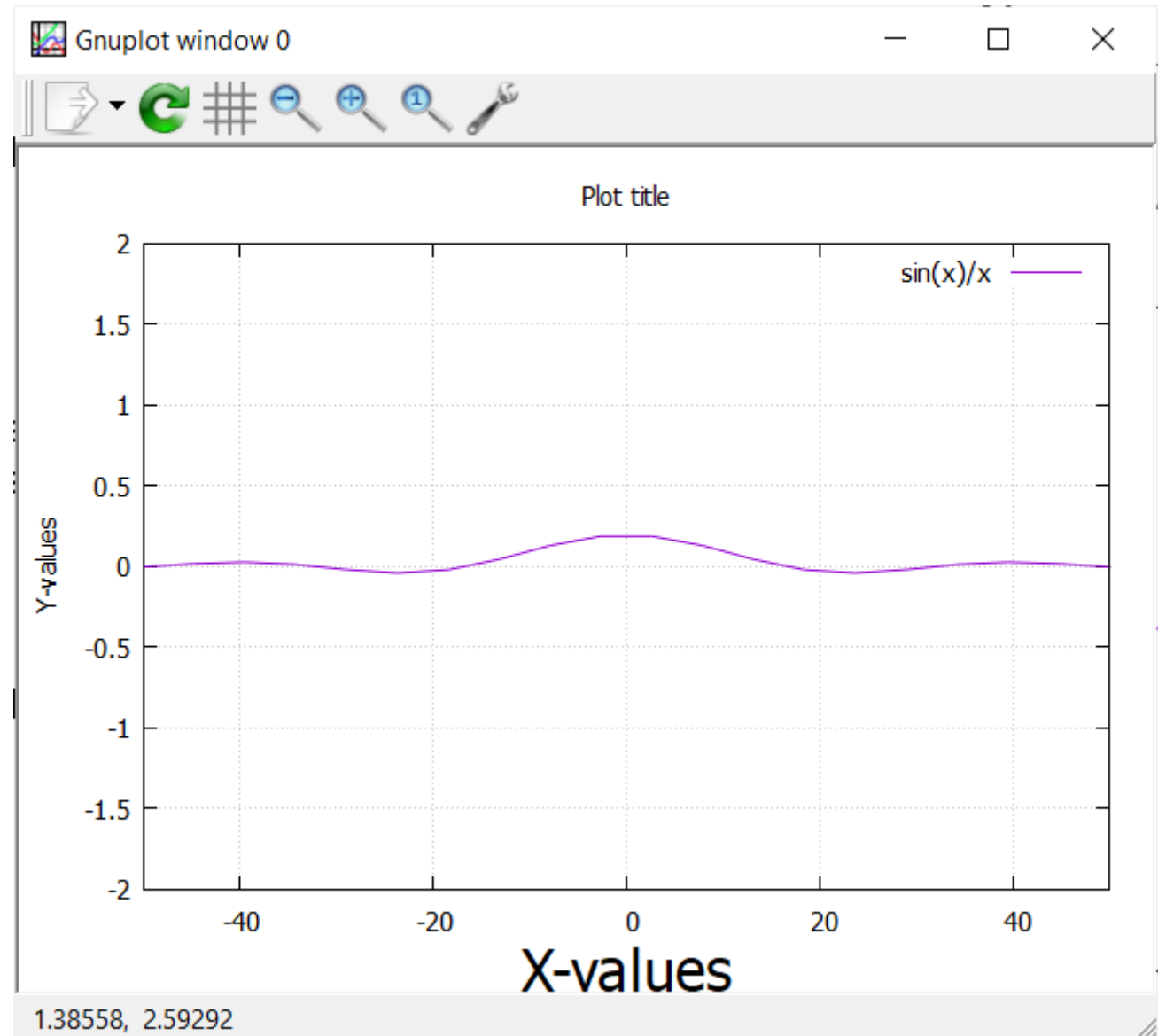


Управление текстовой информацией (2)

```
> set title "Plot title"
```

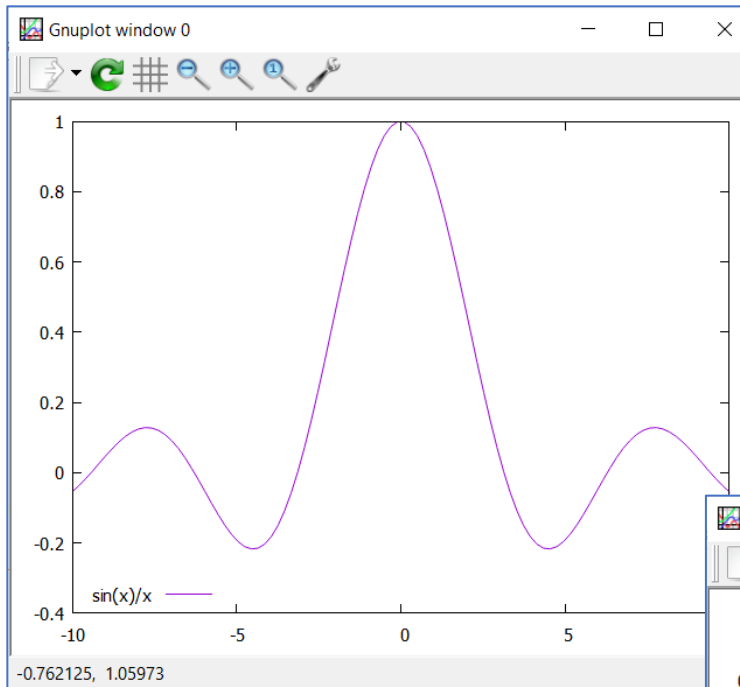
```
> set xlabel font ",20"
```

```
> plot sin(x)/x
```

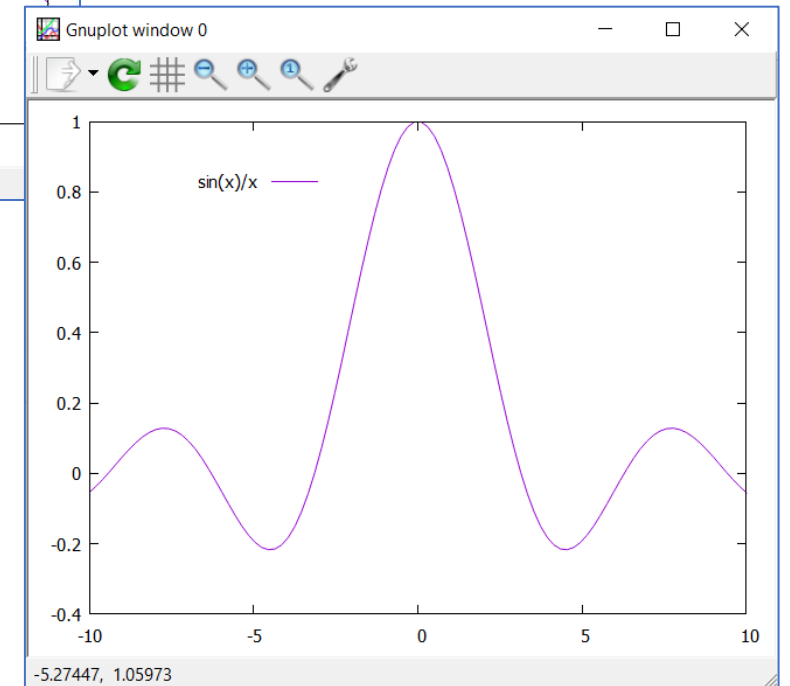


Управление текстовой информацией (3)

> set key left bottom
> plot sin(x)/x

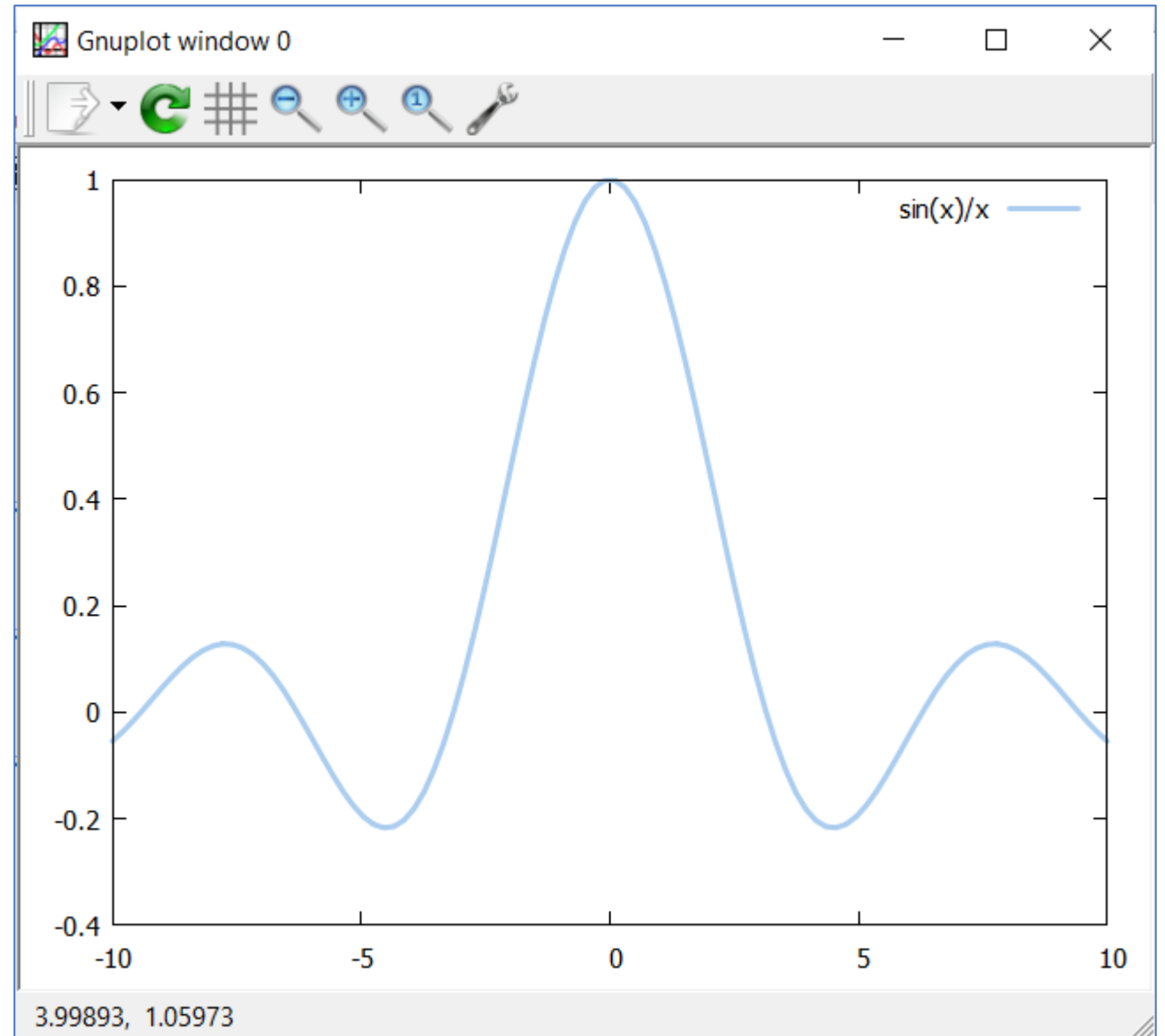


> set key at -7,0.8
> plot sin(x)/x



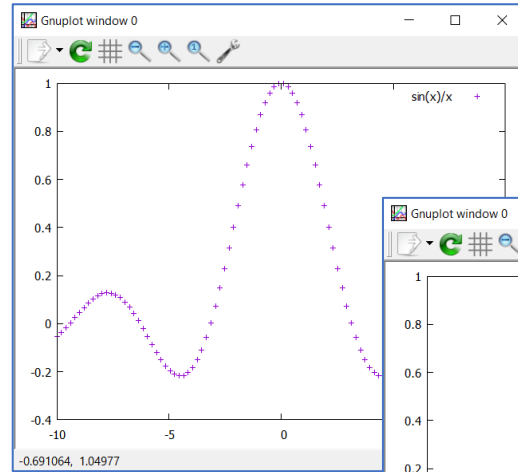
Управление внешним видом графиков (1)

```
> plot sin(x)/x lt rgb "#abcdef"  
    lw 3
```

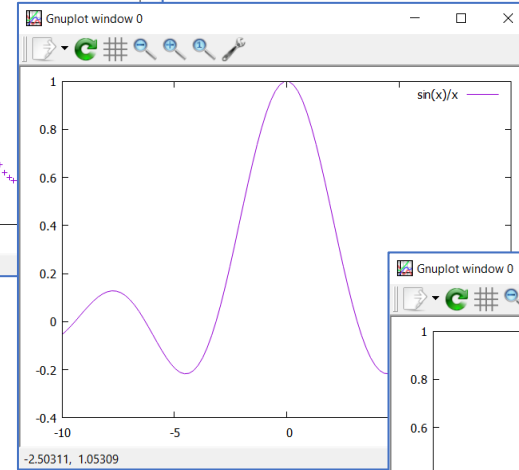


Управление внешним видом графиков (4)

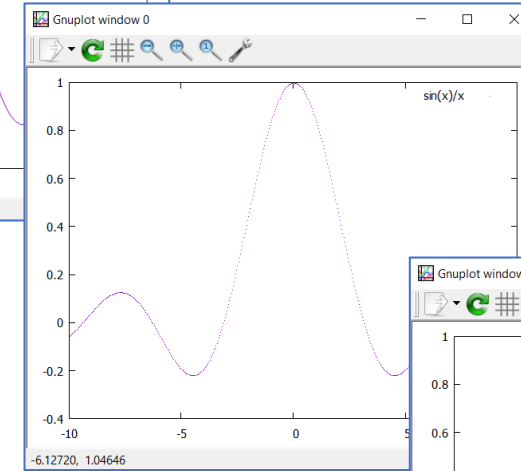
> plot $\sin(x)/x$ with points



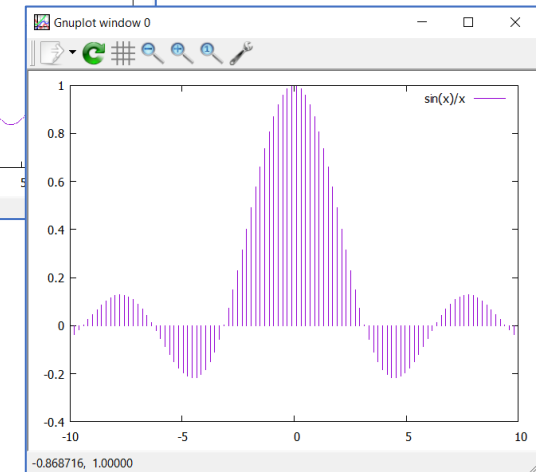
> plot $\sin(x)/x$ with lines



> plot $\sin(x)/x$ with dots



> plot $\sin(x)/x$ with impulses

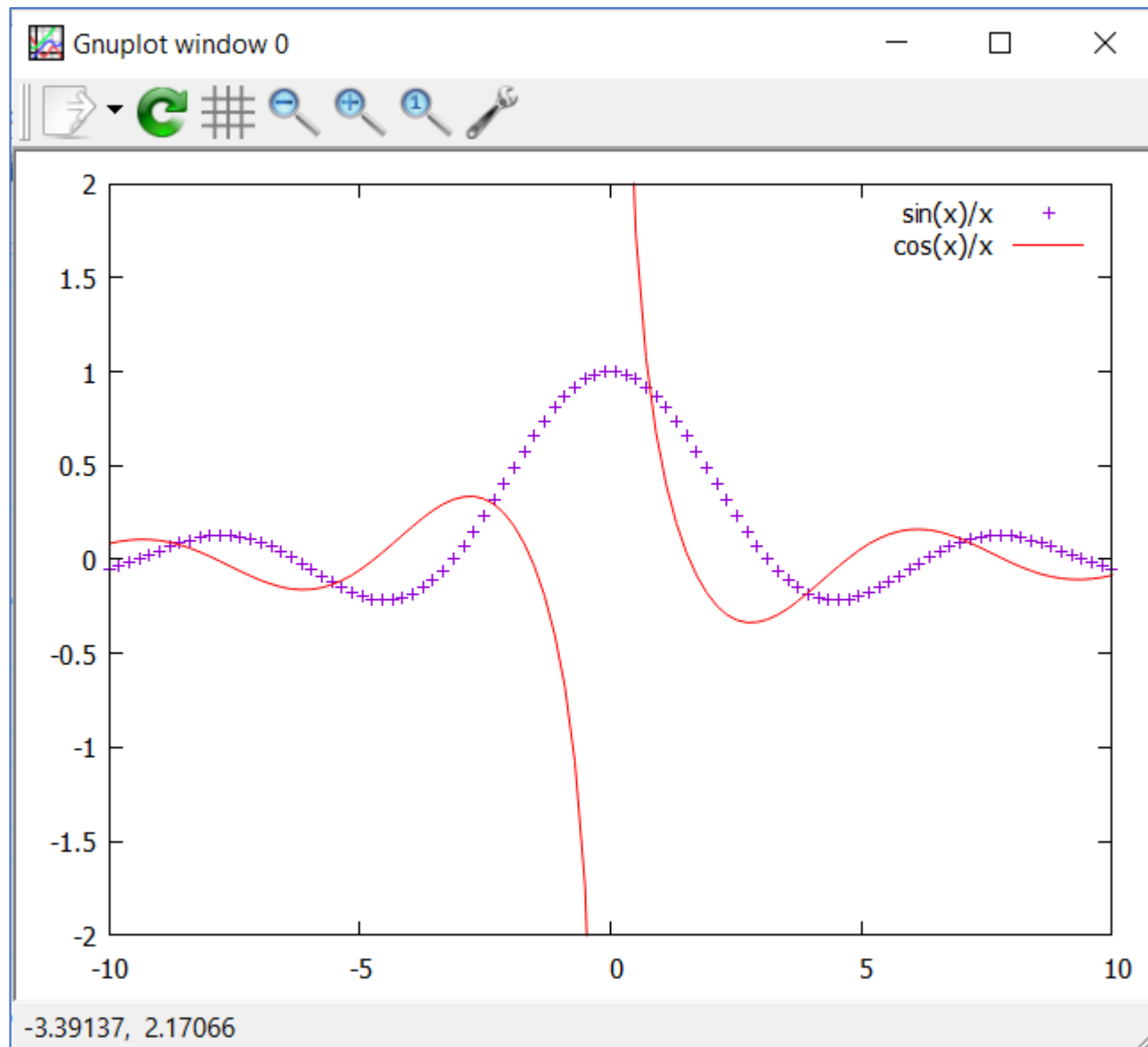


Сложное рисование нескольких графиков

```
> plot sin(x)/x with points,  
      cos(x)/x lt rgb "#ff0000"
```

```
> plot sin(x)/x with points  
> replot cos(x)/x lt rgb "#ff0000"
```

```
> plot sin(x)/x with points  
> set yrange [-2:2]  
> replot cos(x)/x lt rgb "#ff0000"
```



Визуализация данных из файлов

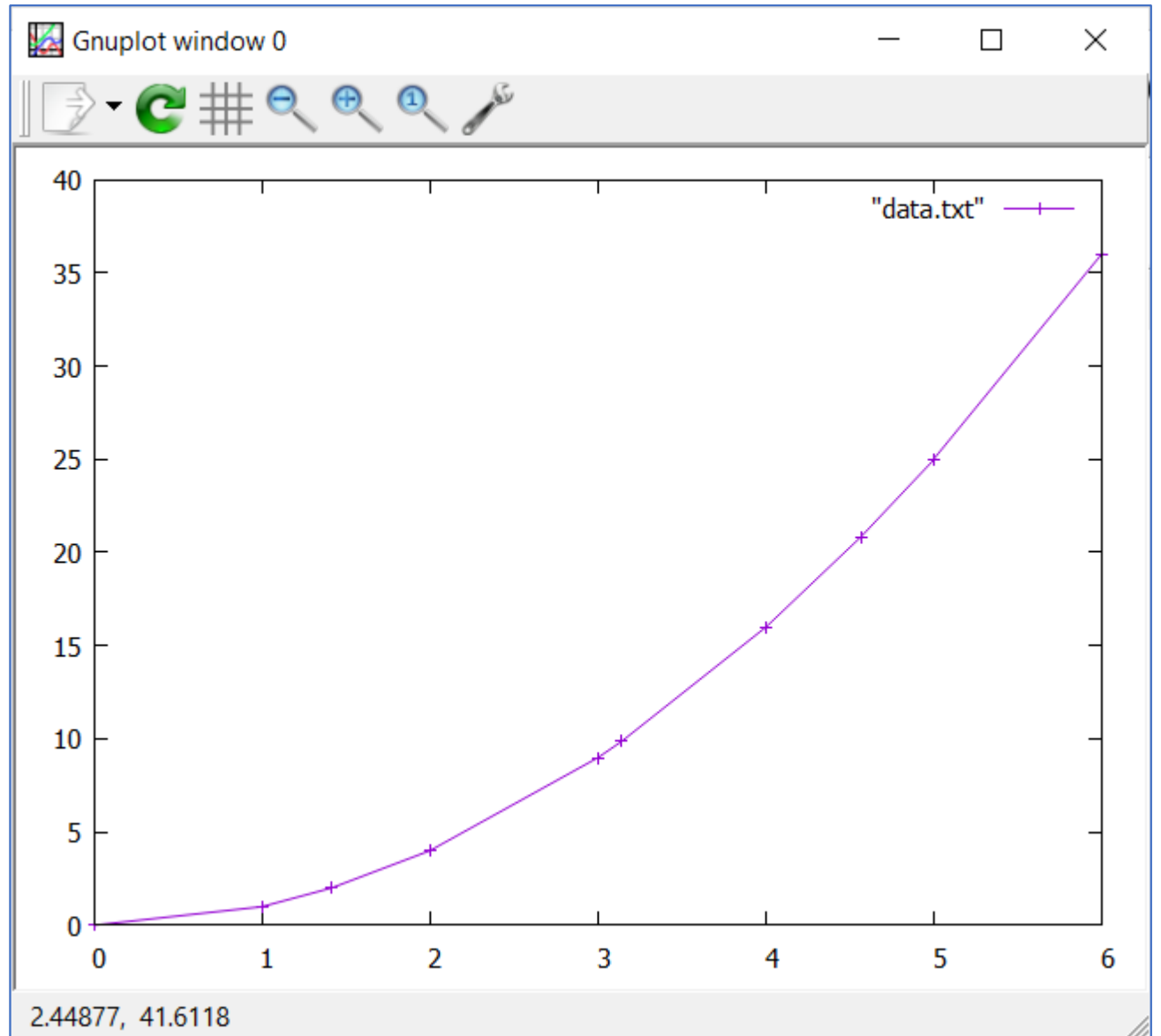
Файл data.txt

0	0	0	5
1	1	2	15
1.4142	2	2.8284	1
2	4	4	30
3	9	6	26.46
3.1415	9.8696	6.2832	39.11
4	16	8	20
4.5627	20.8182	9.1254	17
5.0	25.0	10.0	25.50
6	36	12	0.908

> plot "data.txt"

> plot "data.txt" with lines

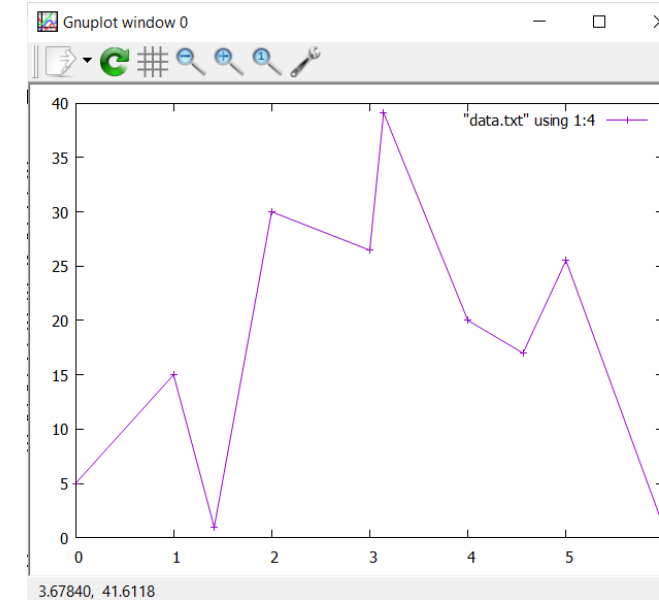
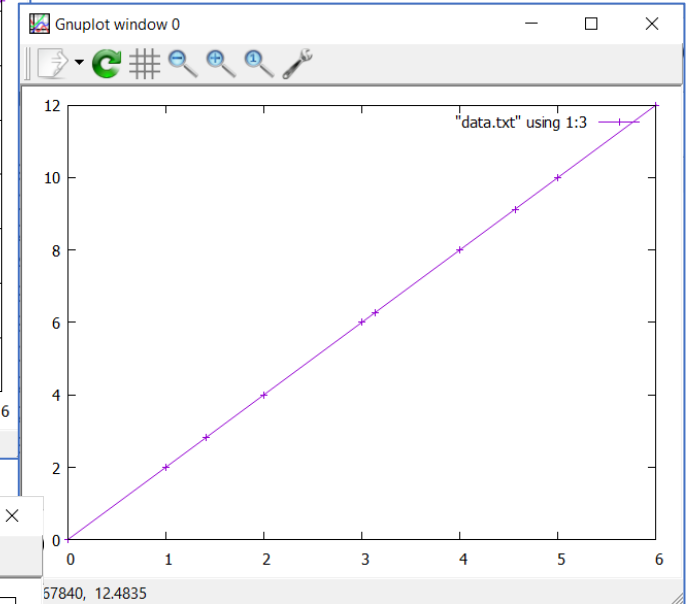
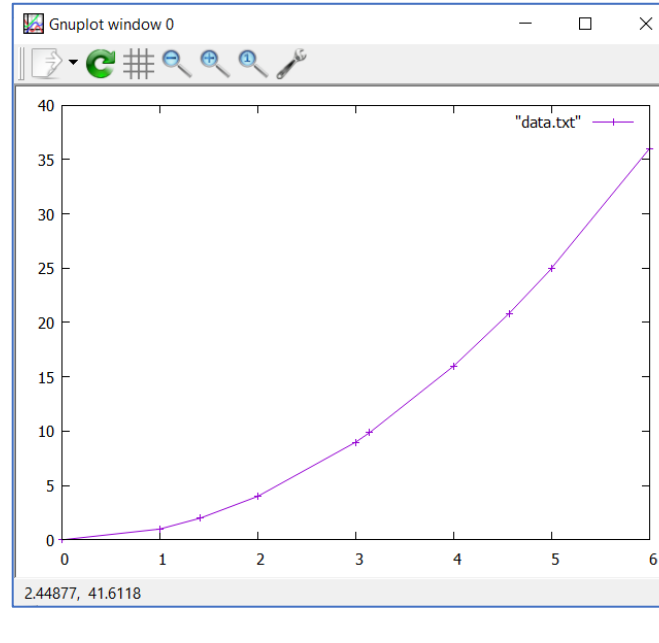
> plot "data.txt" with linespoints



Выбор данных для отрисовки

Файл data.txt

0	0	0	5
1	1	2	15
1.4142	2	2.8284	1
2	4	4	30
3	9	6	26.46
3.1415	9.8696	6.2832	39.11
4	16	8	20
4.5627	20.8182	9.1254	17
5.0	25.0	10.0	25.50
6	36	12	0.908



> plot "data.txt" with linespoints

> plot "data.txt" using 1:3
with linespoints

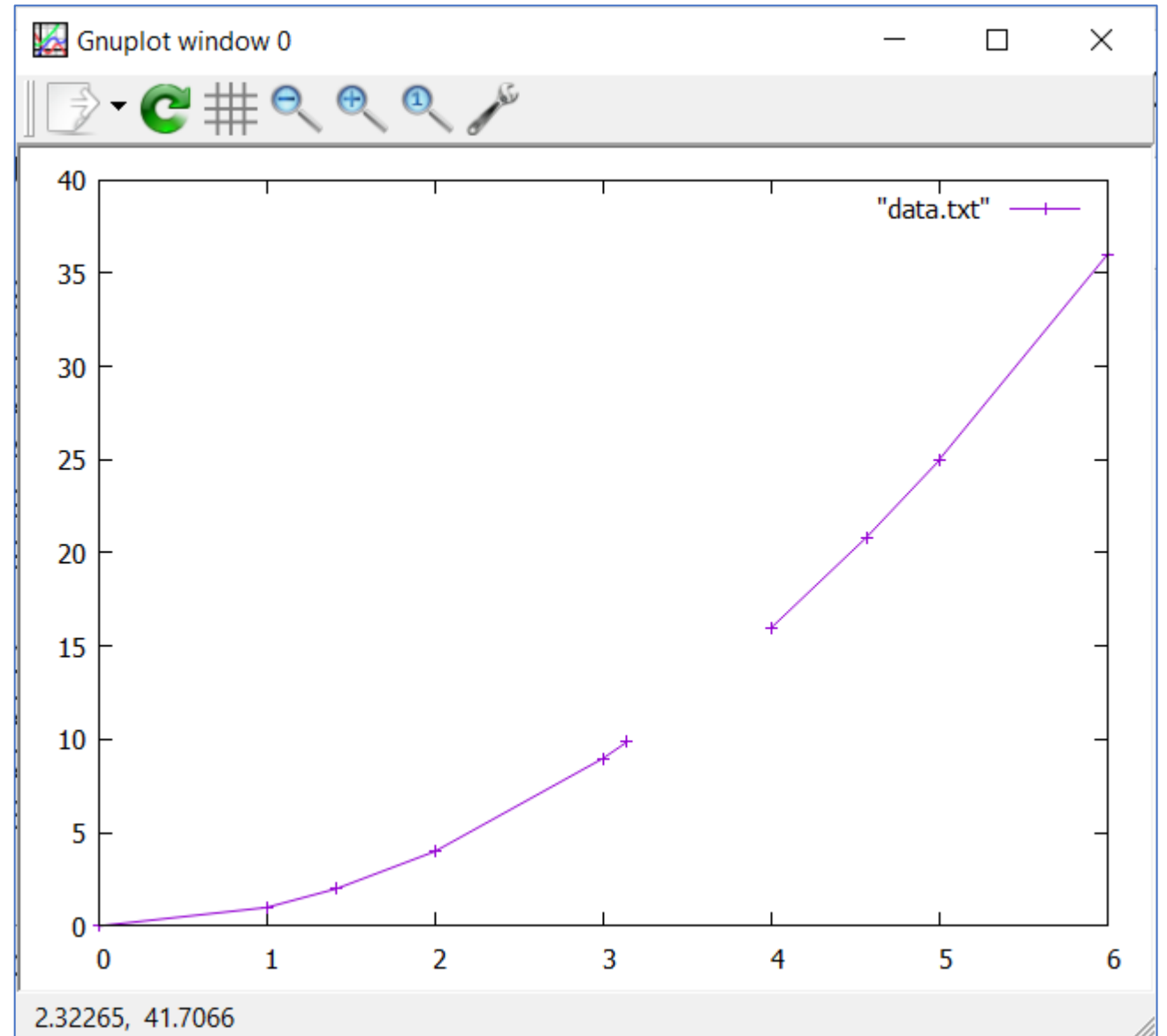
> plot "data.txt" using 1:4
with linespoints

Рисование графика с разрывами

Файл data.txt

0	0	0	5
1	1	2	15
1.4142	2	2.8284	1
2	4	4	30
3	9	6	26.46
3.1415	9.8696	6.2832	39.11
4	16	8	20
4.5627	20.8182	9.1254	17
5.0	25.0	10.0	25.50
6	36	12	0.908

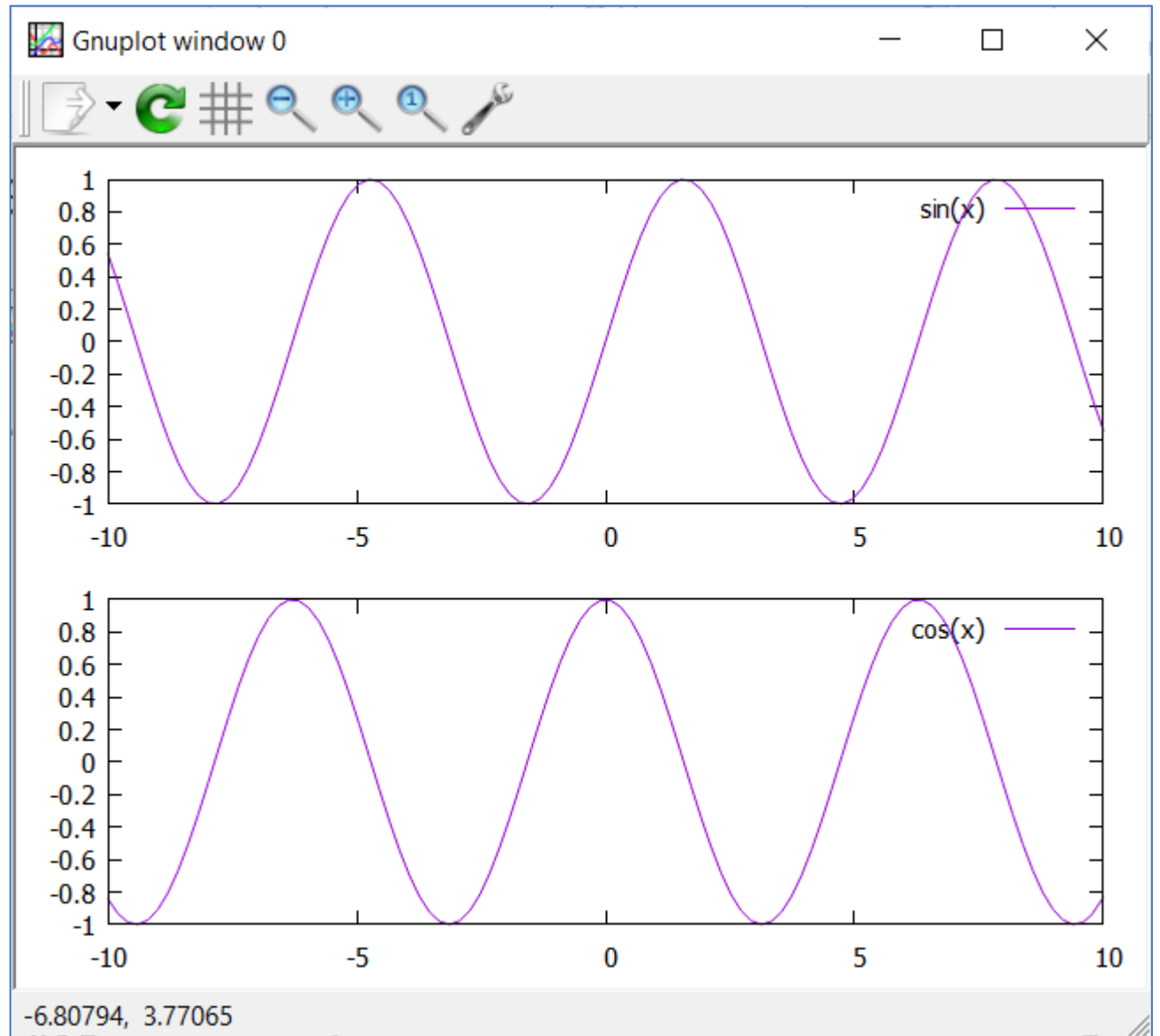
```
> plot "data.txt" with linespoints
```



Несколько отдельных графиков

```
> set multiplot
> set size 1,0.5
> set origin 0.0,0.5
> plot sin(x)
> set origin 0.0,0.0
> plot cos(x)
> unset multiplot
```

```
gnuplot> reset
gnuplot> set multiplot
multiplot> set size 1,0.5
multiplot> set origin 0.0,0.5
multiplot> plot sin(x)
multiplot> set origin 0.0,0.0
multiplot> plot cos(x)
multiplot> unset multiplot
gnuplot> _
```



Визуализация поля данных (1)

```
> splot 'test_35_03.txt' matrix
```

