

Графическая библиотека для Jupyter Notebook PascalABC.NET

Кобзарь Д.В.

*Институт математики, механики и компьютерных наук,
ассистент*

Jupyter Notebook



Реализует более 40 языков, включая
компилируемые C++ и C#.

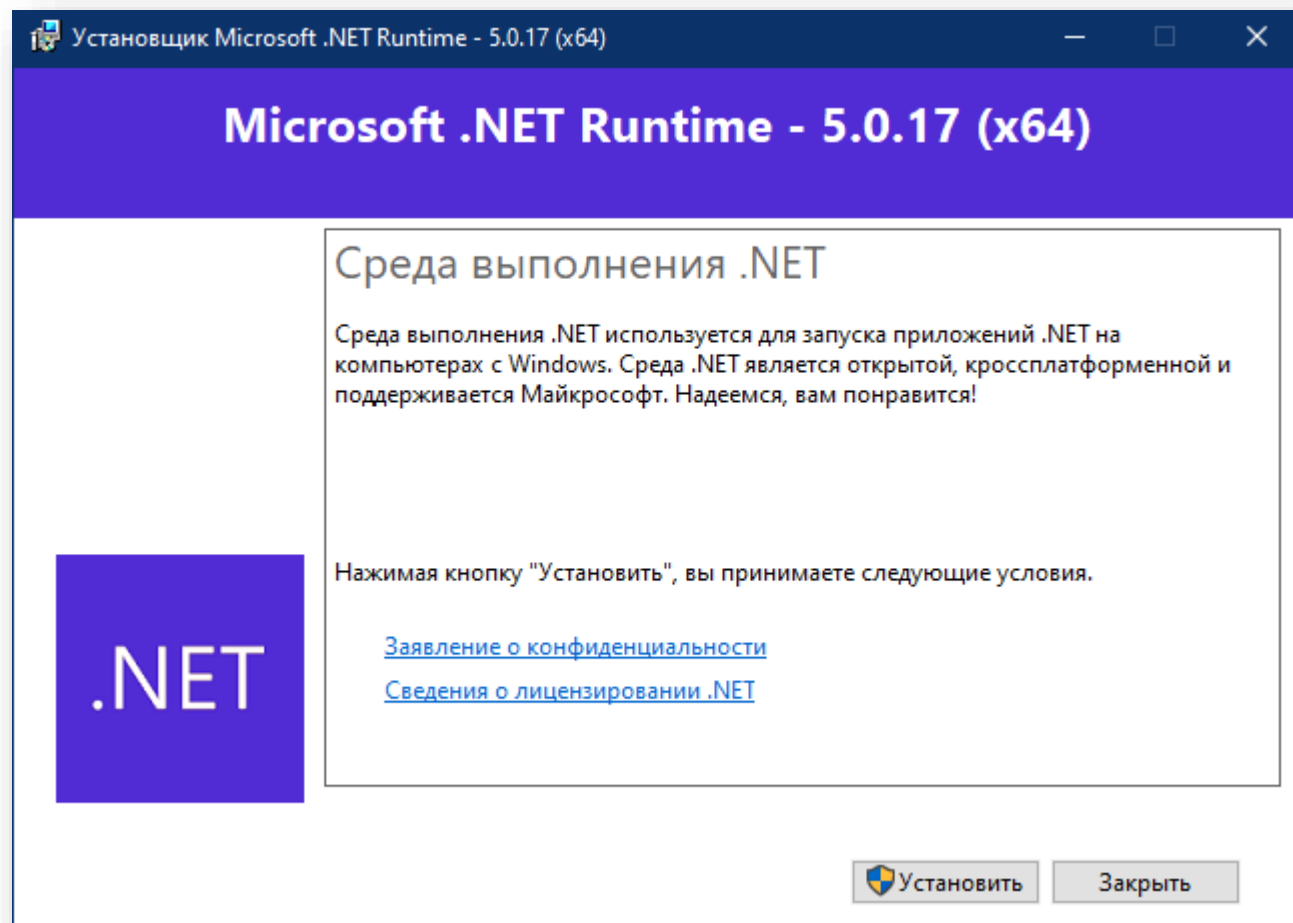
Установка ядра PascalABC.NET

Для запуска ядра требуется:

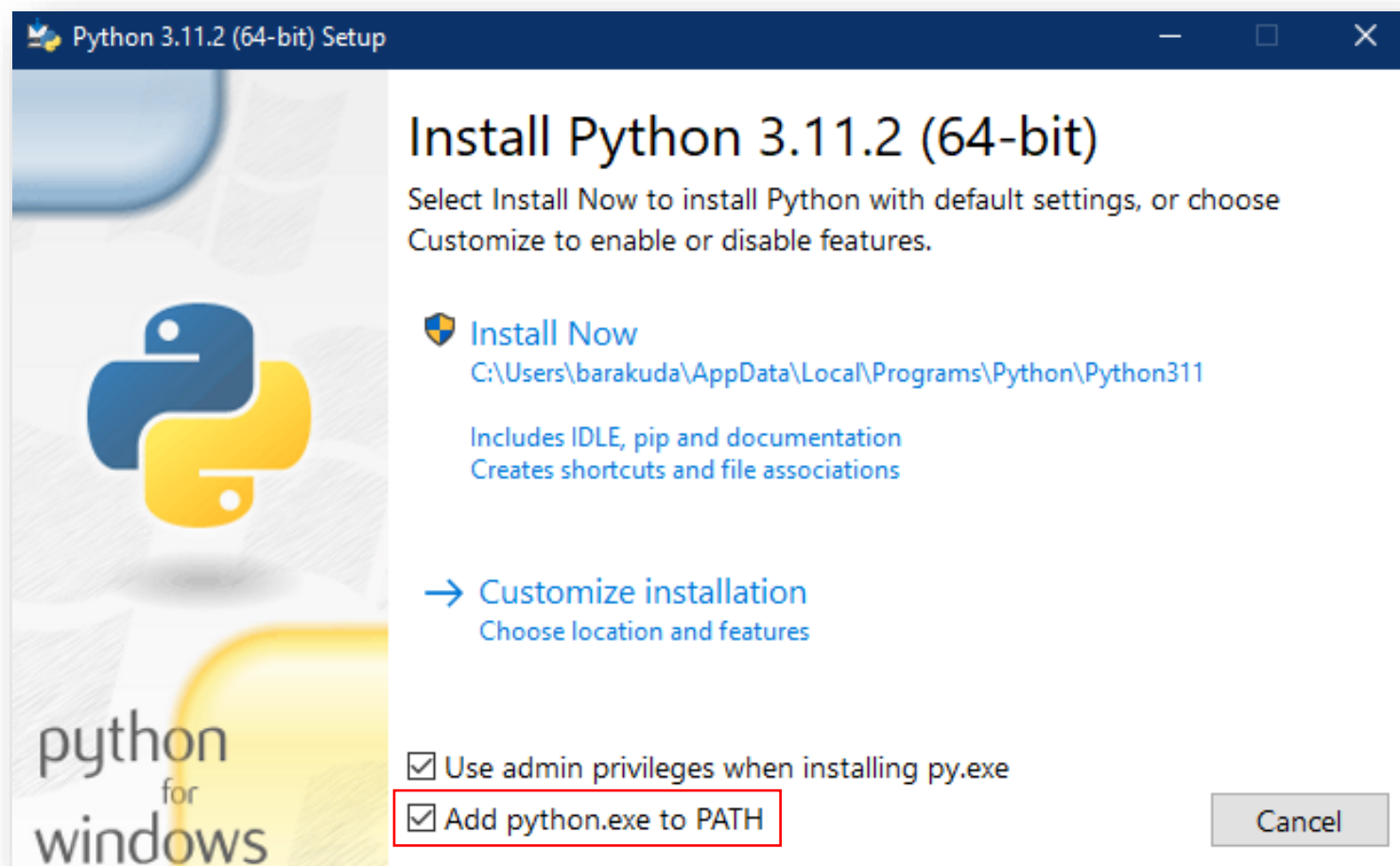
- Runtime для .NET 5.0 (установщик с [официального сайта](#))
- Актуальная версия Python (установщик с [официального сайта](#))
- Jupyter Notebook (пакетный менеджер: **pip install notebook**)
- Актуальная версия ядра (архив с [GitHub Releases](#), **install.bat**)



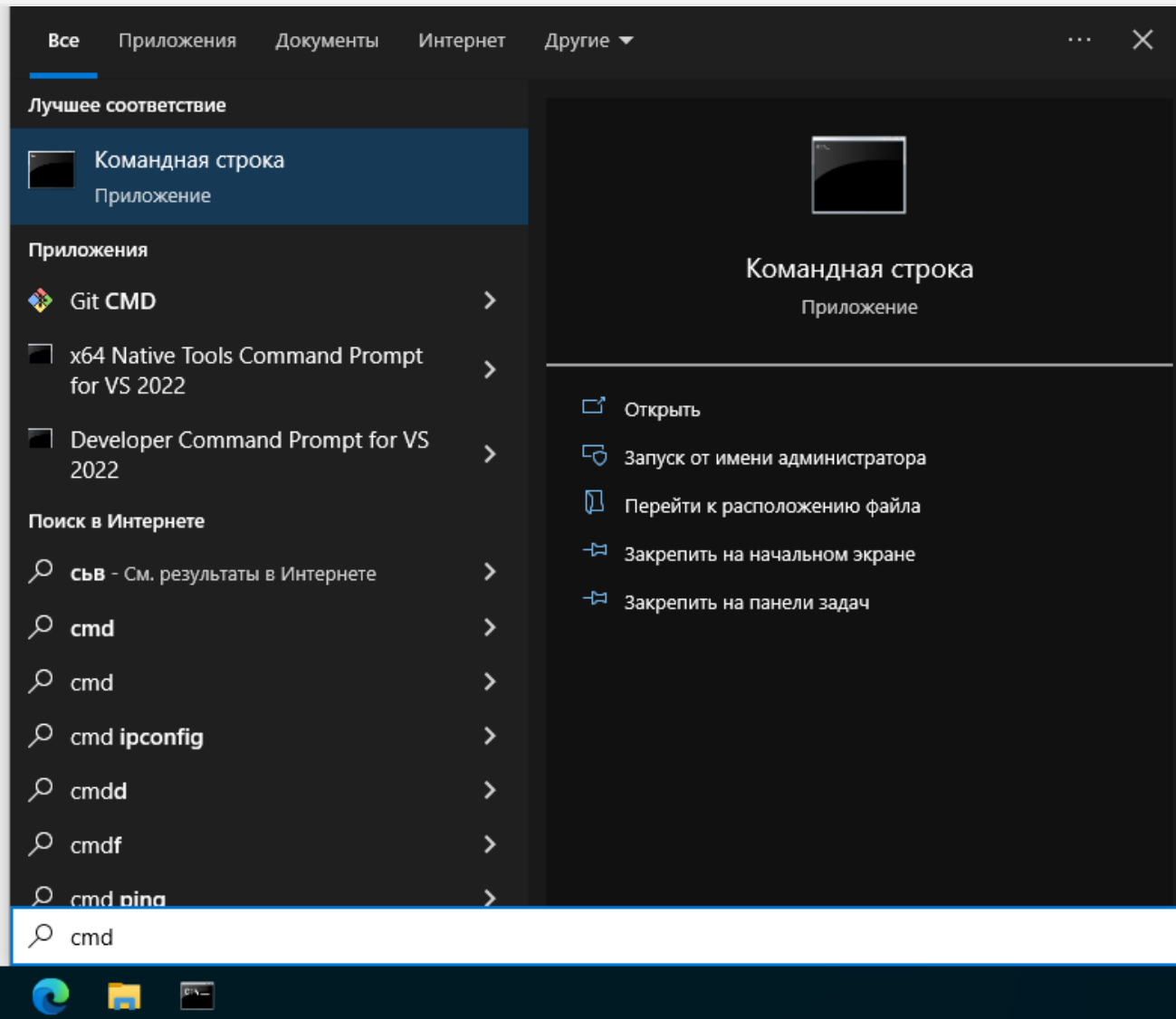
Установка Runtime для .NET 5.0



Установка Python



Установка Jupyter Notebook



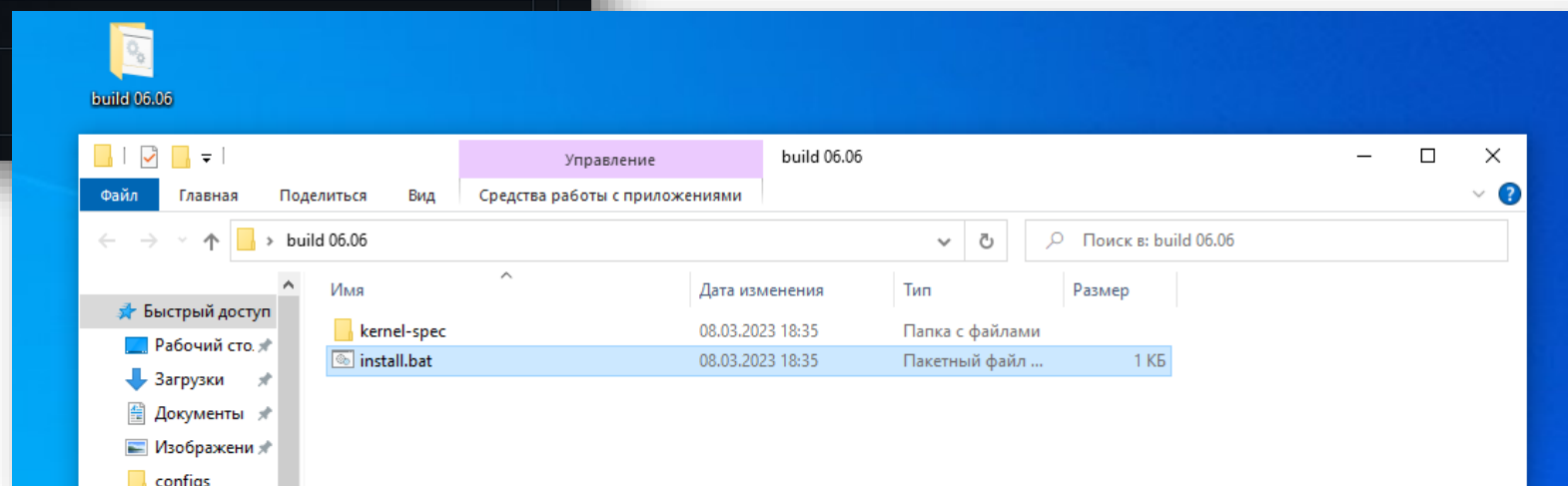
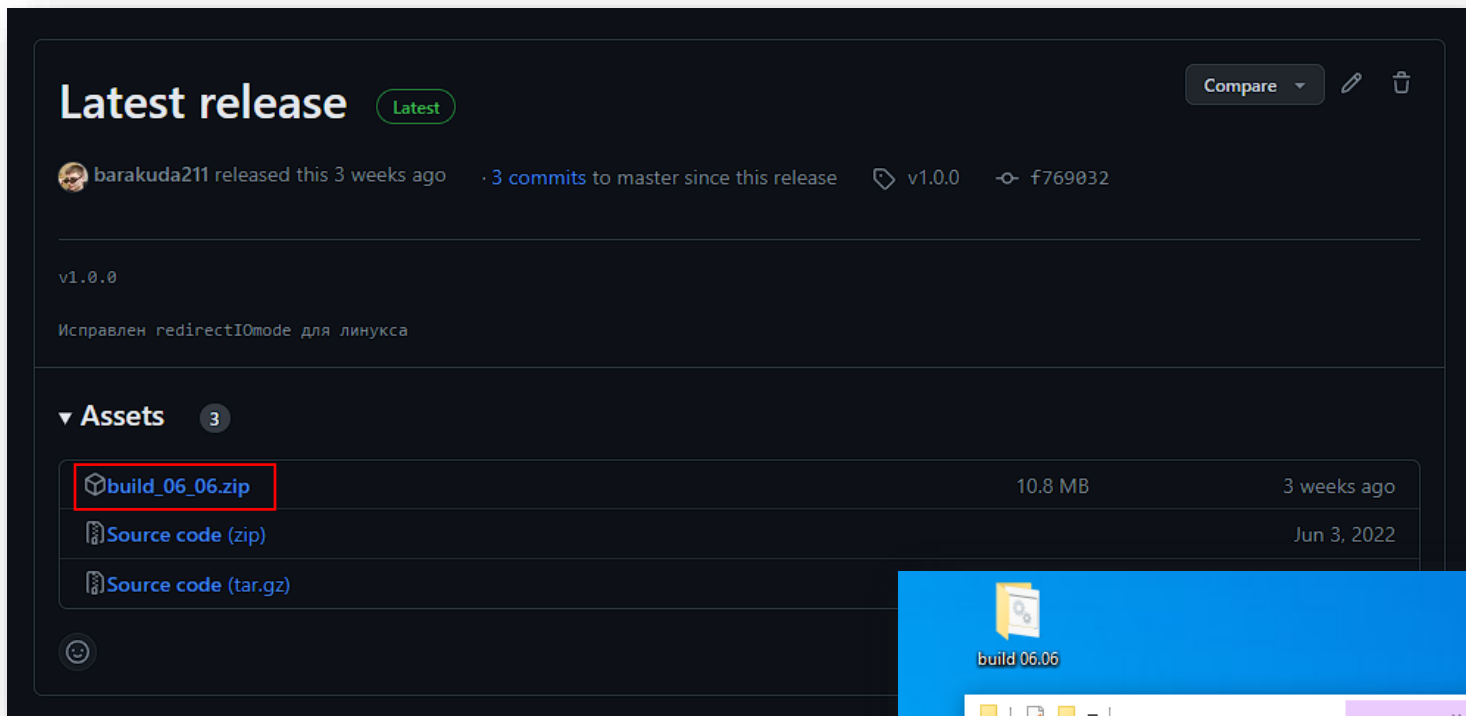
В консоли:

- `pip install notebook`

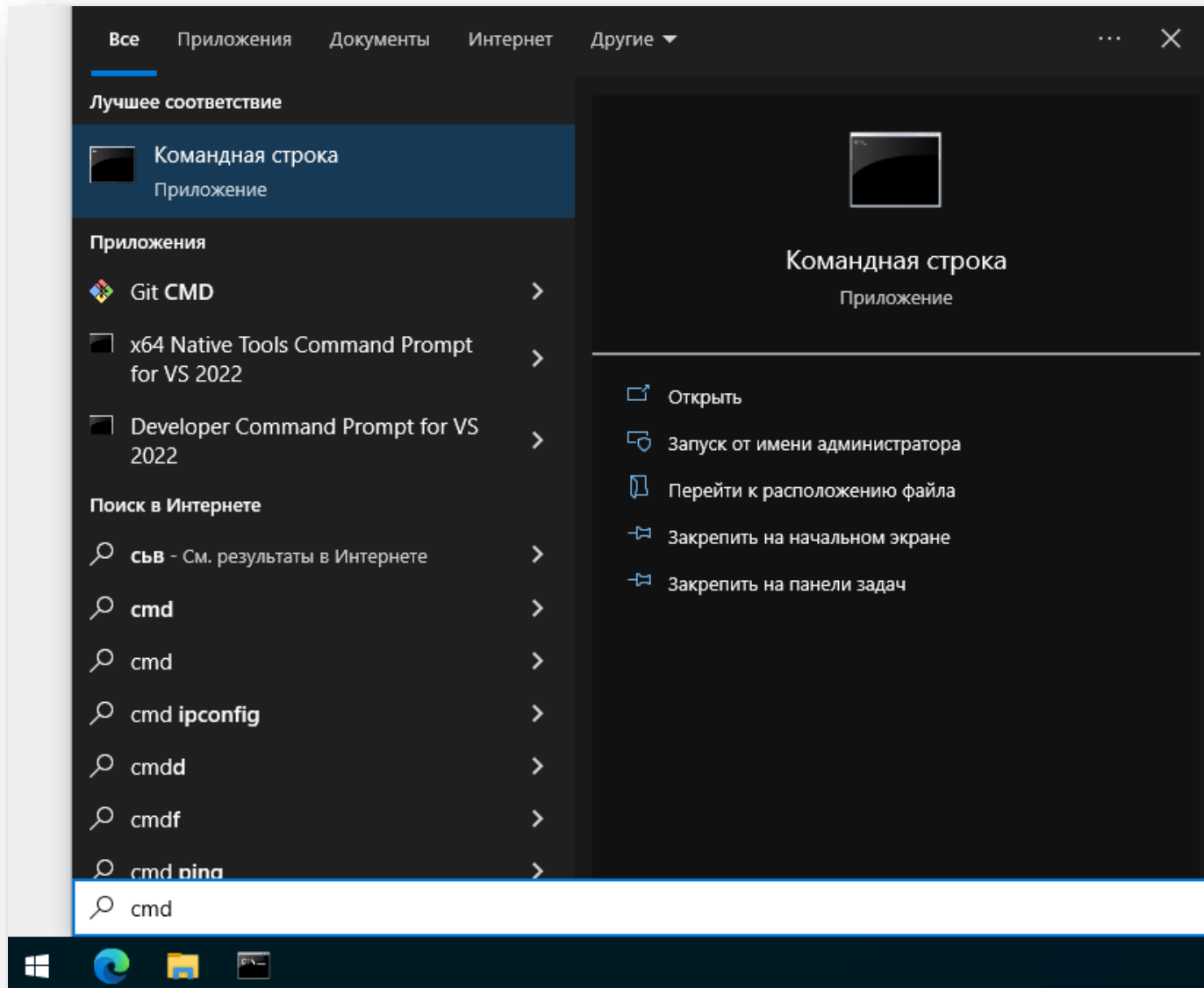
или

- `py -m pip install notebook`

Установка ядра PascalABC.NET



Запуск Jupyter Notebook



В консоли:

- `jupyter notebook`

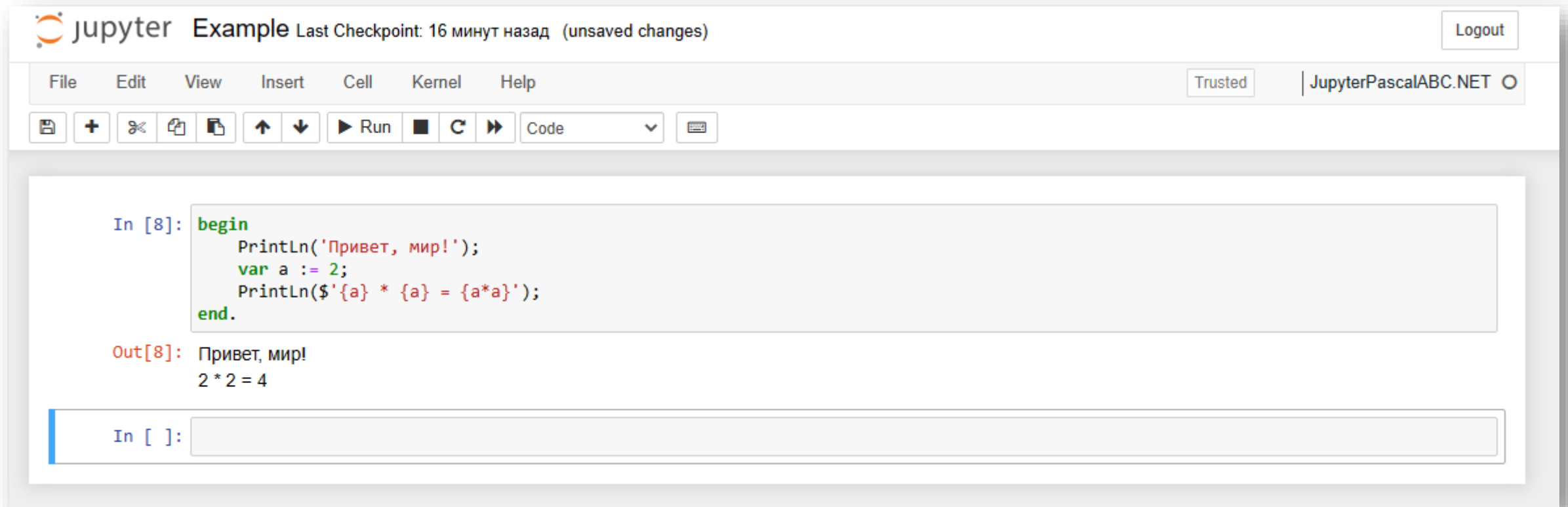
или

- `py -m jupyter notebook`

Создание нового ноутбука PascalABC



Примитивная программа



The screenshot shows a Jupyter Notebook interface. At the top, the header includes the Jupyter logo, the text "jupyter Example", and a status message "Last Checkpoint: 16 минут назад (unsaved changes)". A "Logout" button is in the top right. Below the header is a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", and "Help". To the right of the menu bar are "Trusted" and "JupyterPascalABC.NET" labels. Below the menu bar is a toolbar with icons for saving, adding cells, undo, redo, copy, paste, and navigation, followed by a "Run" button, a "Code" dropdown menu, and a "Kernel" icon. The main area contains a code cell with the following Pascal code:

```
In [8]: begin
        PrintLn('Привет, мир!');
        var a := 2;
        PrintLn('${a} * {a} = {a*a}');
      end.
```

Below the code cell, the output is displayed:

```
Out[8]: Привет, мир!
        2 * 2 = 4
```

At the bottom, there is an empty input cell labeled "In []:".

GraphJupyter

Jupyter Example Last Checkpoint: 23 минуты назад (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted JupyterPascalABC.NET

In [8]:

```
begin
  PrintLn('Привет, мир!');
  var a := 2;
  PrintLn('{a} * {a} = {a*a}');
end.
```

Out[8]: Привет, мир!
2 * 2 = 4

In [11]:

```
uses GraphJupyter;
begin
  WindowSize(700,200);

  Pen.Color := Colors.Red;
  Pen.Width := 2;
  Line(10,10,100,100);

  Line(20,10,110,100,Colors.Blue);

  var arr1:= Arr((new Point(50,10),new Point(150,100)),
                (new Point(60,10),new Point(160,100)));
  Lines(arr1,Colors.Purple);

  var arr:= Arr(new Point(200,10),new Point(300,100),
                new Point(400,10),new Point(500,100));
  PolyLine(arr,Colors.Pink);
end.
```

Out[11]: 

In []:

Другие примитивы GraphJupyter

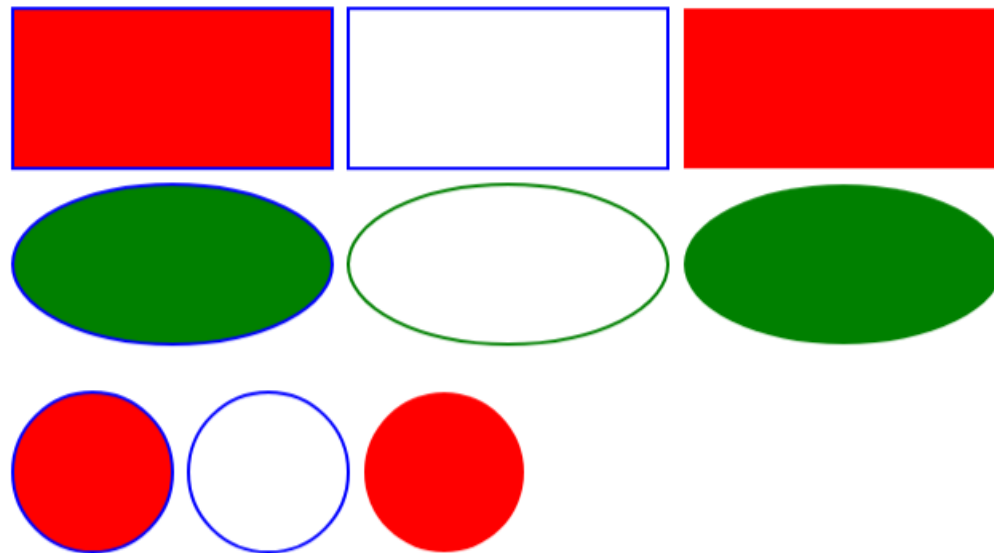
```
In [21]: uses GraphJupyter;
begin
  WindowSize(700,400);
  Brush.Color := Colors.Red;
  Pen.Color := Colors.Blue;
  Pen.Width := 2;

  Rectangle(10,10,200,100);
  DrawRectangle(220,10,200,100);
  FillRectangle(430, 10,200,100);

  Ellipse(110,170,100,50,Colors.Green);
  DrawEllipse(320,170,100,50,Colors.Green);
  FillEllipse(530,170,100,50,Colors.Green);

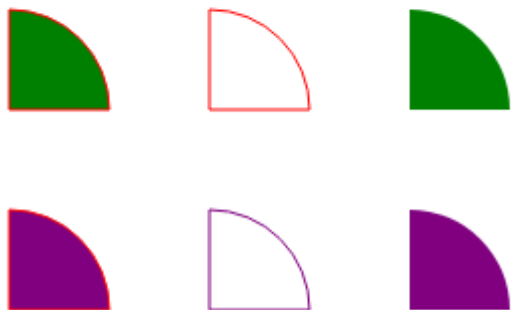
  Circle(60,300,50);
  DrawCircle(170,300,50);
  FillCircle(280,300,50);
end.
```

Out[21]:

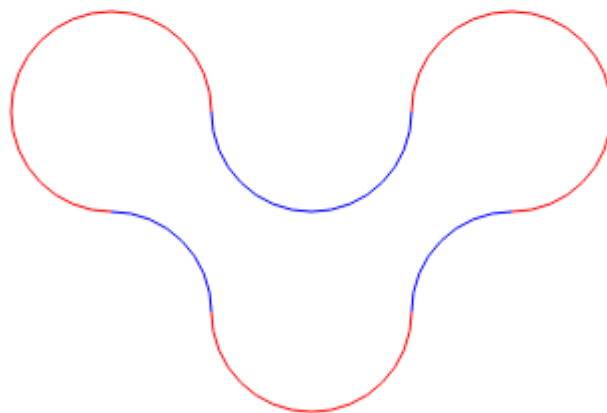


Другие примитивы GraphJupyter

```
uses GraphJupyter;
begin
  WindowSize(700,300);
  Pen.Color := Colors.Red;
  Pen.Width := 1;
  Brush.Color := Colors.Green;
  Sector(100,100,50,0,90);
  DrawSector(200,100,50,0,90);
  FillSector(300,100,50,0,90);
  Sector(100,200,50,0,90,Colors.Purple);
  DrawSector(200,200,50,0,90,Colors.Purple);
  FillSector(300,200,50,0,90,Colors.Purple);
end.
```



```
uses GraphJupyter;
begin
  WindowSize(700,300);
  Pen.Color := Colors.Blue;
  Pen.Width := 1;
  Arc(100,100,50,0,270,Colors.Red);
  Arc(200,100,50,-180,0);
  Arc(300,100,50,-90,180,Colors.Red);
  Arc(100,200,50,0,90);
  Arc(300,200,50,90,180);
  Arc(200,200,50,-180,0,Colors.Red);
end.
```



Вывод текста

	Top	Center	Bottom
Left			
Center			
Right			

Текст под углом 30 градусов!

```
uses GraphJupyter;
begin
  WindowSize(700,300);
  Brush.Color := Colors.Black;
  Pen.Width := 0.5;
  Pen.Color := Colors.Red;

  for var i := 1 to 3 do
    for var j := 1 to 3 do
      begin
        Line(i*100-30,j*50,i*100+30,j*50);
        Line(i*100,j*50-15,i*100,j*50+15);
      end;
      TextOut(90,10,'Top');
      TextOut(185,10,'Center');
      TextOut(280,10,'Bottom');
      TextOut(10,40,'Left');
      TextOut(10,90,'Center');
      TextOut(10,140,'Right');

      Font.Color := Colors.Black;
      TextOut(100,50,'hello',Alignment.LeftTop);
      TextOut(200,50,'hello',Alignment.LeftCenter);
      TextOut(300,50,'hello',Alignment.LeftBottom);

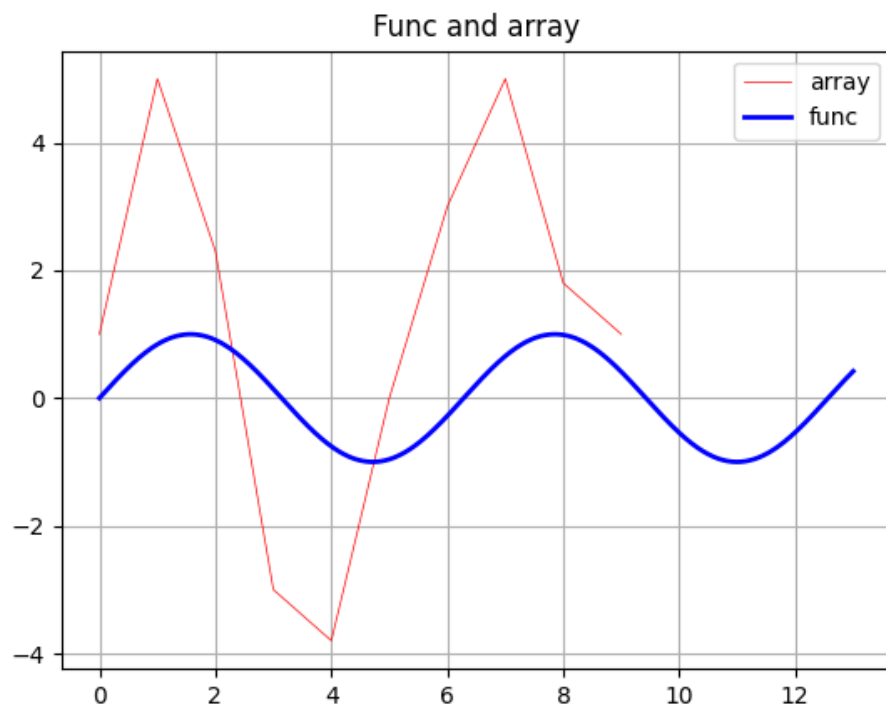
      Font.Color := Colors.Green;
      TextOut(100,100,'hello',Alignment.CenterTop);
      TextOut(200,100,'hello',Alignment.Center);
      TextOut(300,100,'hello',Alignment.CenterBottom);

      Font.Color := Colors.Purple;
      TextOut(100,150,'hello',Alignment.RightTop);
      TextOut(200,150,'hello',Alignment.RightCenter);
      TextOut(300,150,'hello',Alignment.RightBottom);

      TextOut(400,30,'Текст под углом 30 градусов!',Alignment.LeftTop,30);
    end;
  end.
```

Сравнение MPL и PlotterJupyter

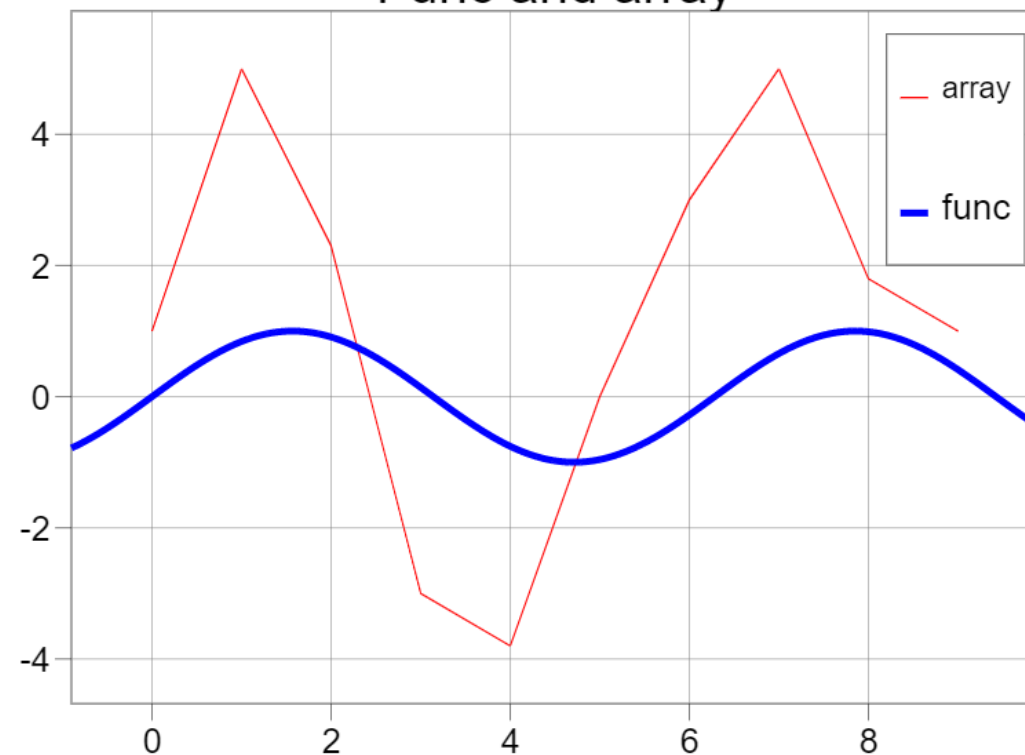
```
from matplotlib import pyplot as plt
import numpy as np
y = [1,5,2.3,-3,-3.8,0,3,5,1.8,1]
fig, ax = plt.subplots()
ax.plot(y, label='array', color='red',linewidth =0.5)
X = np.linspace(0, 13, 1024,endpoint=True)
S = np.sin(X)
ax.plot(X,S,label='func', color='blue',linewidth =2)
ax.legend()
ax.grid()
ax.set(title="Func and array")
plt.show()
```



```
uses PlotterJupyter;
begin
  var fig := new Figure();
  var ax := fig.AddSubplot();
  ax.Plot(new real[10](1,5,2.3,-3,-3.8,0,3,5,1.8,1)).linewidth := 0.5;
  ax.Plot((x:real) -> sin(x),Colors.Blue).linewidth := 2;
  ax.grid := true;
  ax.EqualProportion := false;
  ax.SetLegend(Arr('array','func'));
  ax.Title := 'Func and array';
  Show(fig);
end.
```

X: 2.869 Y: 6.080

Func and array



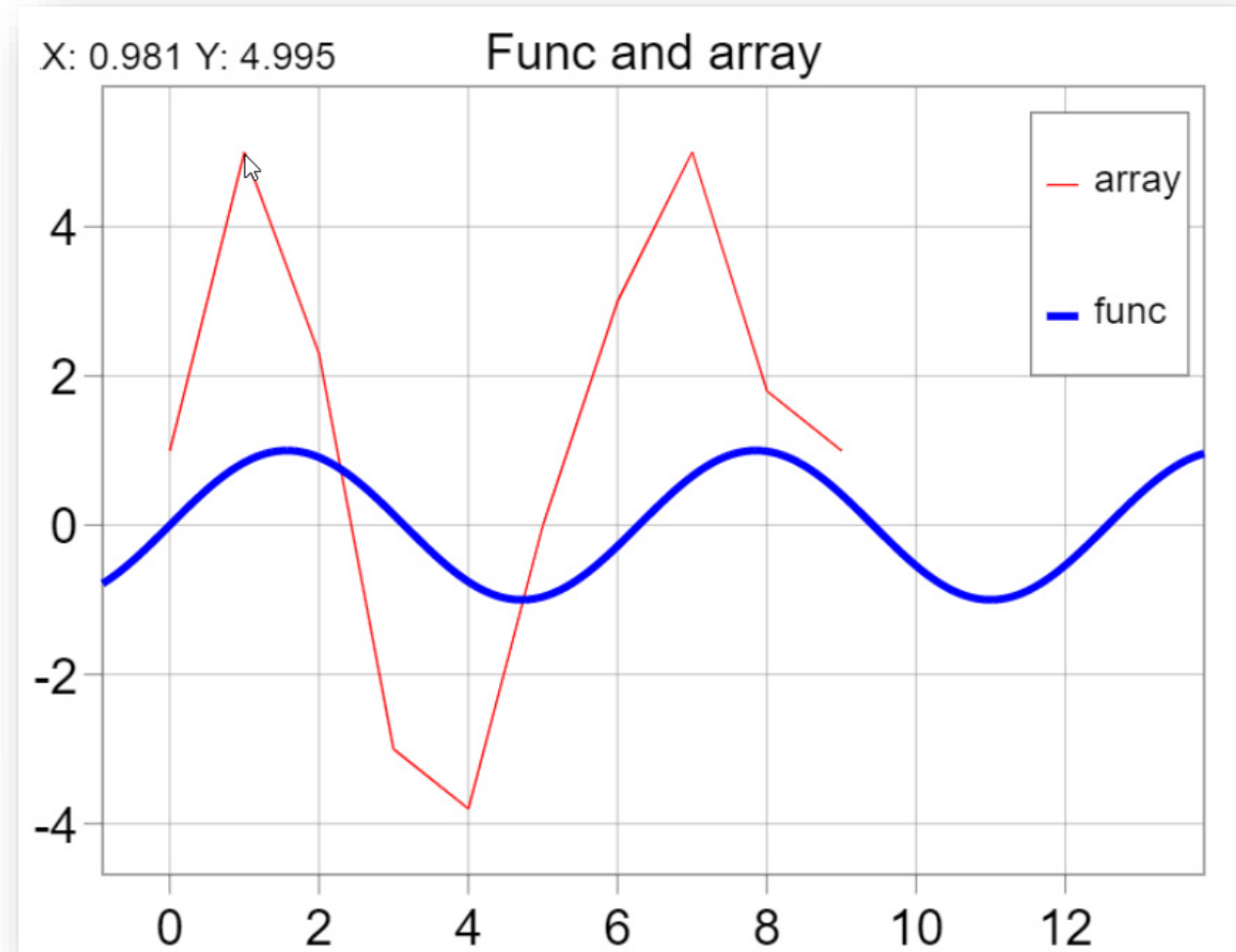
PlotterJupyter

```
uses PlotterJupyter;
begin
  var fig := new Figure();
  var ax := fig.AddSubplot();

  var plot1 := ax.Plot(new real[10](1,5,2.3,-3,-3.8,0,3,5,1.8,1));
  plot1.linewidth := 0.5;

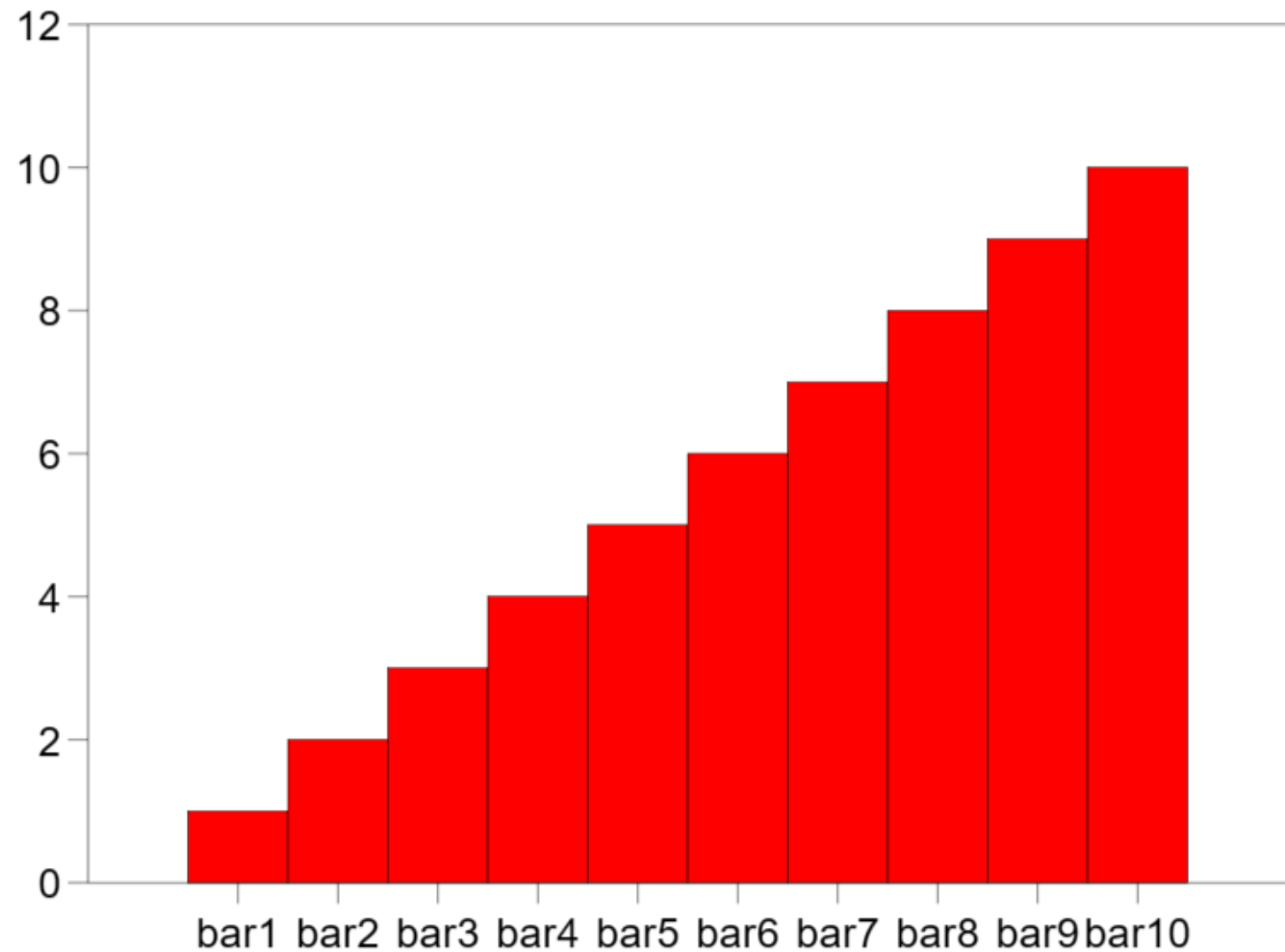
  var plot2 := ax.Plot((x:real) -> sin(x),Colors.Blue);
  plot2.linewidth := 2;

  ax.grid := true;
  ax.EqualProportion := false;
  ax.SetLegend(Arr('array','func'));
  ax.Title := 'Func and array';
  Show(fig);
end.
```



PlotterJupyter

```
uses PlotterJupyter;  
begin  
  var fig := new Figure();  
  var ax := fig.AddSubplot();  
  var crv := ax.Bar(new real[10](1,2,3,4,5,6,7,8,9,10));  
  crv.SetBarLabels((1..10).Select(x->'bar'+x).ToArray);  
  ax.TrackMouse := false;  
  Show(fig);  
end.
```



PlotterJupyter

```
uses PlotterJupyter;
begin
  var fig := new Figure();

  var y1 := ArrRandomReal(100);
  var y2 := ArrRandomReal(100);
  var y3 := ArrRandomReal(100);
  var avg := y1.Zip(y2,(a,b)->(a+b)/2).Zip(y3,(a,b)->(a+b)/2);

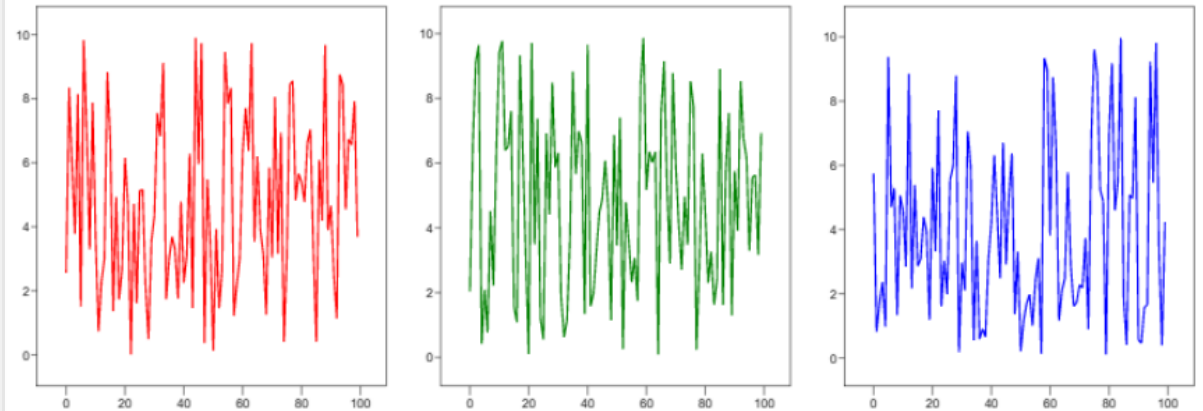
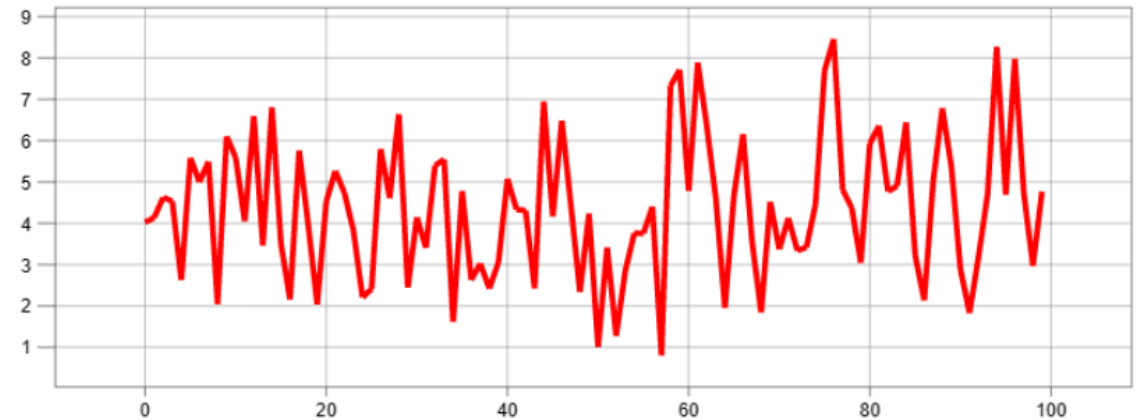
  var ax := fig.AddSubplot(2,1,0);
  var c := ax.Plot(avg.ToArray);
  c.LineWidth := 3;
  ax.Grid := true;

  ax := fig.AddSubplot(2,3,3);
  ax.Plot(y1);

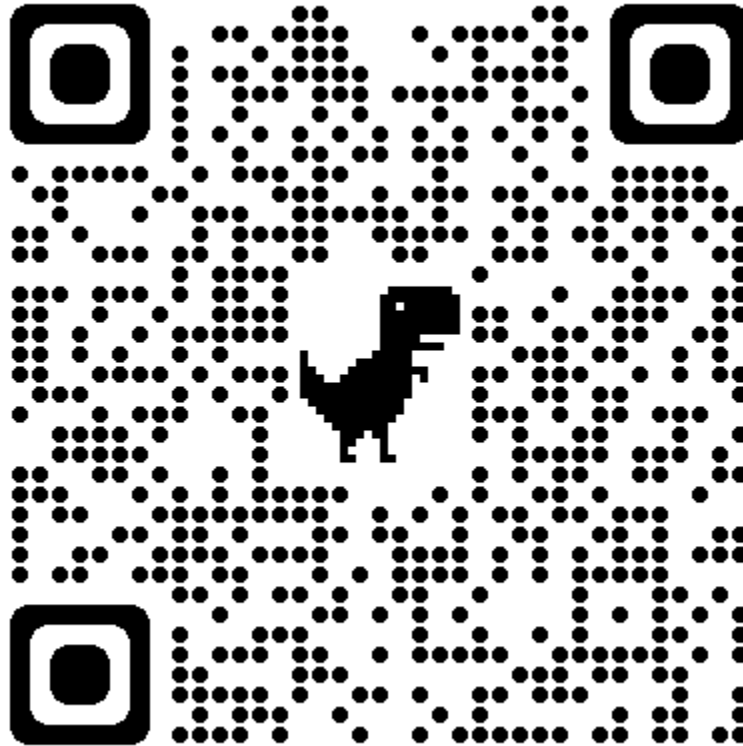
  ax := fig.AddSubplot(2,3,4);
  ax.Plot(y2,Colors.Green);

  ax := fig.AddSubplot(2,3,5);
  ax.Plot(y3, Colors.Blue);

  Show(fig);
end.
```



GitHub проекта



<https://github.com/Looken15/JupyterPascalABC.NET>

СПАСИБО
ЗА
ВНИМАНИЕ