http://pyx.sourceforge.net/

PyX 0.7.1
Examples

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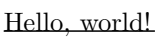
January 13, 2005

Abstract

The following examples are part of the PyX release 0.7.1. For each PyX example the source code and the corresponding output are shown. Please pay attention to source code comments within the examples for further information.

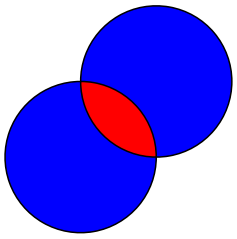
hello

```
from pyx import *

c = canvas.canvas()
c.text(0, 0, "Hello, world!")
c.stroke(path.line(0, 0, 2, 0))
c.writeEPSfile("hello")
```



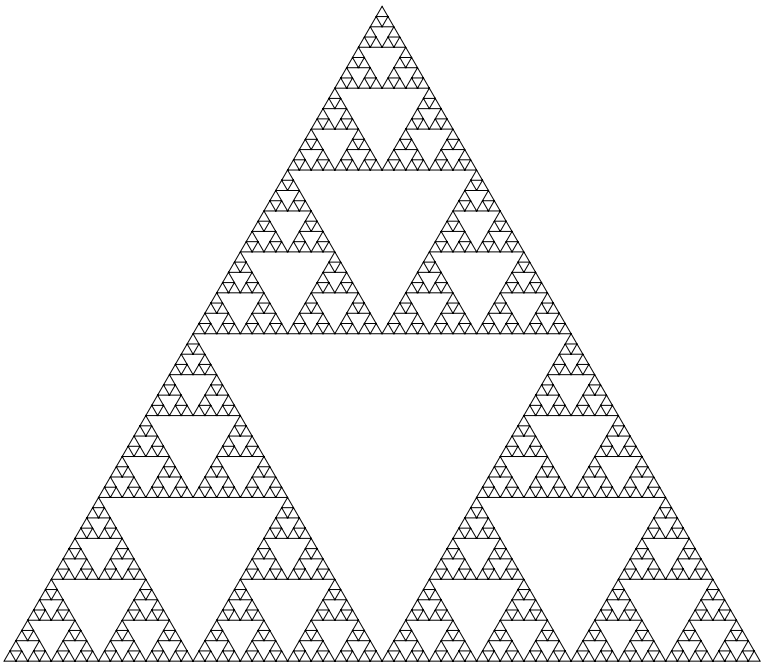
path/circles

```
from pyx import *

circ1 = path.circle(0, 0, 1).normpath() # you don't really need normpath,
circ2 = path.circle(1, 1, 1).normpath() # but its better to have it once
                                        # for those operations
(circ1a, circ1b), (circ2a, circ2b) = circ1.intersect(circ2)
intersection = (circ2.split([circ2b, circ2a])[1]
                << circ1.split([circ1a, circ1b])[1])
intersection[-1].close()

union = (circ1.split([circ1a, circ1b])[0]
         << circ2.split([circ2b, circ2a])[0])
union[-1].close()

c = canvas.canvas()
c.fill(union, [color.rgb.blue])
c.fill(intersection, [color.rgb.red])
c.stroke(circ1)
c.stroke(circ2)
c.writeEPSfile("circles")
```



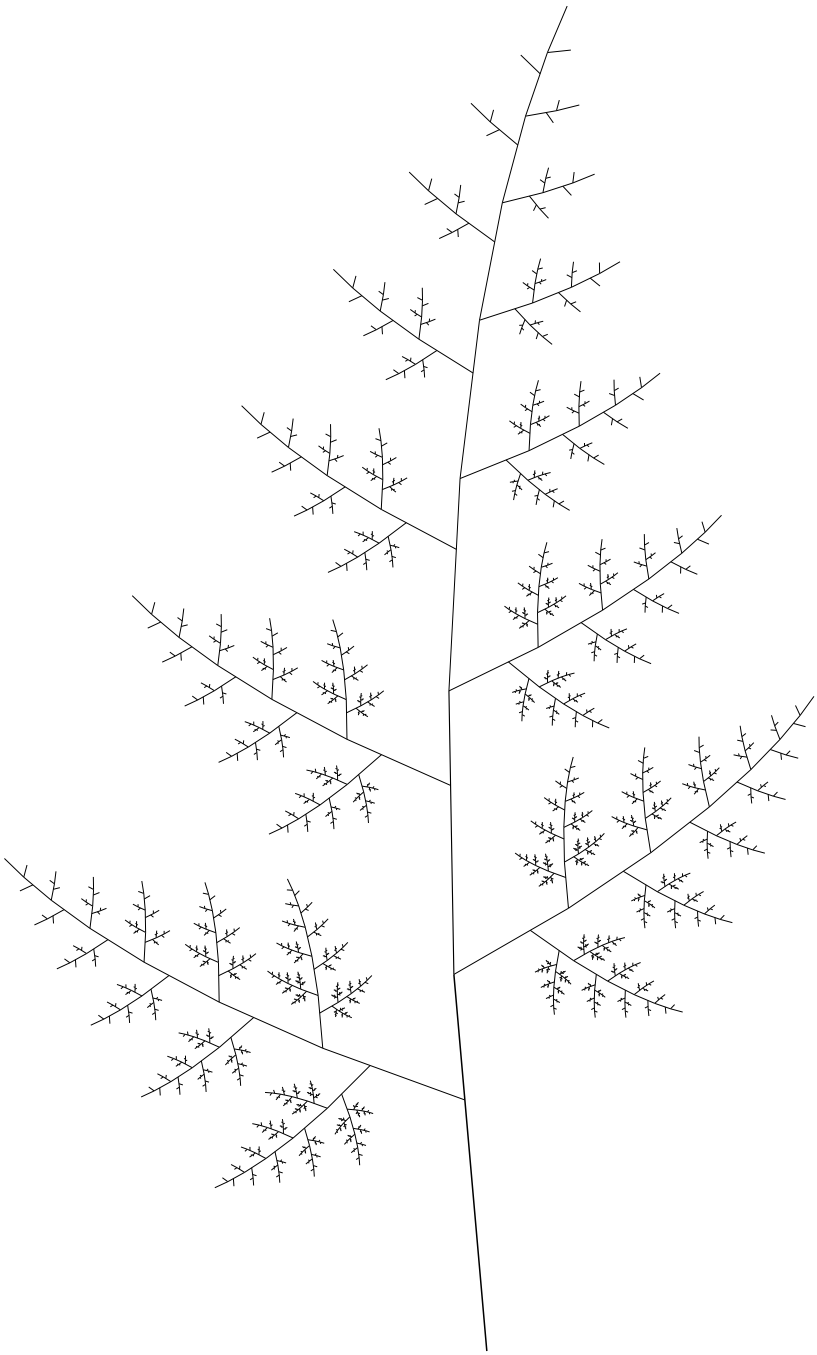
path/sierpinski

```
# Sierpinski triangle
# contributed by Gerhard Schmid

from math import sqrt
from pyx import *

# triangle geometry
l = 10
h = 0.5 * sqrt(3) * l

# base triangle path
p = path.path(path.moveto(0, 0),
              path.lineto(l, 0),
              path.lineto(0.5 * l, h),
              path.closepath())

for i in range(6):
    # path is scaled down ...
    p = p.transformed(trafo.scale(0.5))
    # ... and three times plotted (translated accordingly)
    p += ( p.transformed(trafo.translate(0.5 * l, 0)) +
           p.transformed(trafo.translate(0.25 * l, 0.5 * h)) )

c = canvas.canvas()
c.stroke(p, [style.linewidth.Thin])
c.writeEPSfile("sierpinski", paperformat="a4")
```



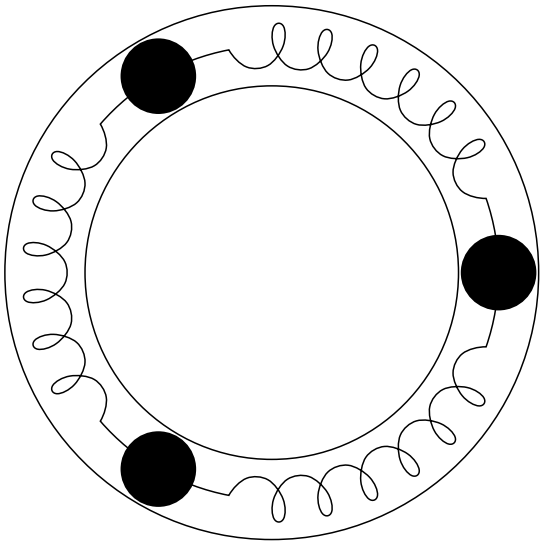
path/tree

```
# -*- coding: ISO-8859-1 -*-
# fractal tree
# contributed by Gerhard Schmid and André Wobst

from pyx import *

# base tree length
l = 5

# base transformations for the left , center, and right part of the tree
ltrafo = trafo.rotate(65).scaled(0.4).translated(0, l * 2.0 / 3.0)
ctrafo = trafo.rotate(-4).scaled(0.75).translated(0, l)
rtrafo = trafo.mirror(90).rotated(-65).scaled(0.35).translated(0, l)

def tree(depth):
    "return transformations for a recursive tree of given depth"
    r = [trafo.rotate(5)]
    if depth > 0:
        subtree = tree(depth - 1)
        r.extend([t*ltrafo for t in subtree])
        r.extend([t*ctrafo for t in subtree])
        r.extend([t*rtrafo for t in subtree])
    return r

c = canvas.canvas()
for t in tree(7):
    # apply the transformation to a "sub"-canvas and insert it into the "main" canvas
    c.insert(canvas.canvas([t])).stroke(path.line(0, 0, 0, l))
c.writeEPSfile("tree", paperformat="a4")
```



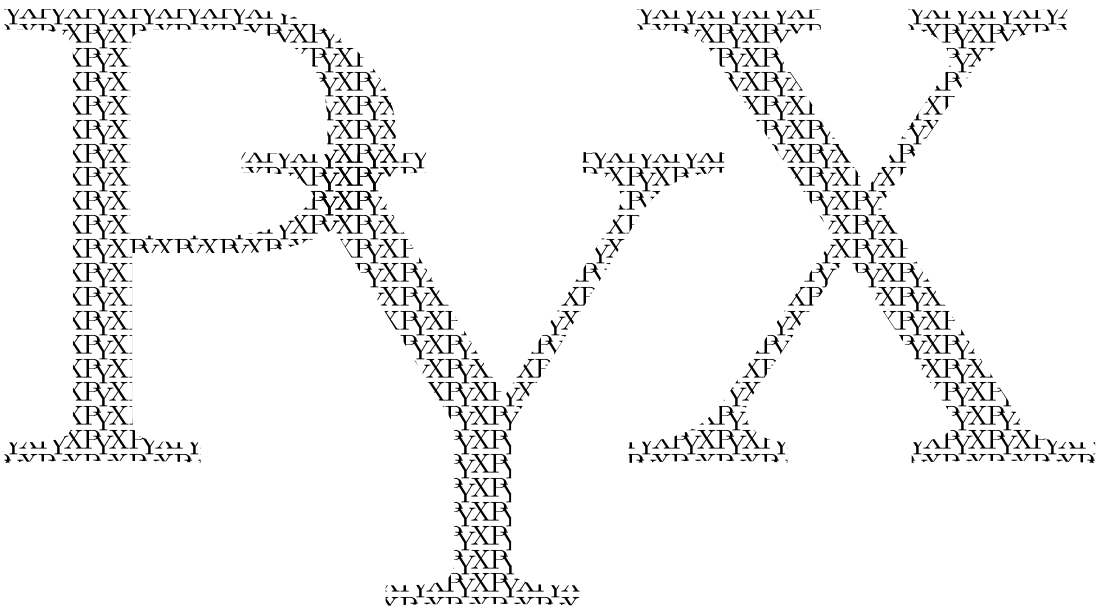
path/springs

```
# contributed by Gert-Ludwig Ingold

from pyx import *
from math import cos, sin, pi

n = 3                       # number of masses
r = 3.0                     # system radius
dphi = 360.0/float(n)       # angle between masses
dphir = dphi/180.0*pi       #     the same in radians
rcyc = 0.3                  # radius of cycloid
nl = 13                     # number of loops
rc = 0.5                    # radius of masses
eps = 0.03                  # extra spacing for surrounding circles

c = canvas.canvas()
for i in range(n):
  c.stroke(path.path(path.arc(0, 0, r, i*dphi, (i+1)*dphi)),
                [deformer.cycloid(rcyc, nl)])
  c.fill(path.circle(r*cos(i*dphir), r*sin(i*dphir), rc),
                [deco.filled([color.grey.black])])

c.stroke(path.circle(0, 0, r - rc - eps))
c.stroke(path.circle(0, 0, r + rc + eps))

c.writeEPSfile("springs")
```



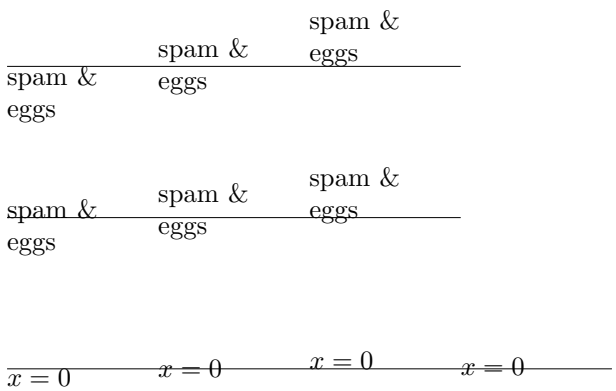
misc/pattern

```
from pyx import *

p = canvas.pattern()
p.text(0, 0, r"\PyX")

c = canvas.canvas()
c.text(0, 0, r"\PyX", [trafo.scale(25), p])
c.writeEPSfile("pattern")
```



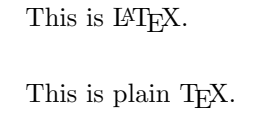
misc/valign

```
from pyx import *

c = canvas.canvas()

# apply global TeX setting
text.preamble(r"\parindent=0pt")
w = 1.2 # an appropriate parbox width

# vertical alignments by margins
c.stroke(path.line(0, 4, 6, 4), [style.linewidth.THin])
c.text(0, 4, r"spam \& eggs", [text.parbox(w), text.valign.top])
c.text(2, 4, r"spam \& eggs", [text.parbox(w), text.valign.middle])
c.text(4, 4, r"spam \& eggs", [text.parbox(w), text.valign.bottom])

# vertical alignments by baselines
c.stroke(path.line(0, 2, 6, 2), [style.linewidth.THin])
c.text(0, 2, r"spam \& eggs", [text.parbox(w, baseline=text.parbox.top)])
c.text(2, 2, r"spam \& eggs", [text.parbox(w, baseline=text.parbox.middle)])
c.text(4, 2, r"spam \& eggs", [text.parbox(w, baseline=text.parbox.bottom)])

# vertical shifts
c.stroke(path.line(0, 0, 8, 0), [style.linewidth.THin])
c.text(0, 0, r"x=0", [text.mathmode, text.vshift.topzero])
c.text(2, 0, r"x=0", [text.mathmode, text.vshift.middlezero])
c.text(4, 0, r"x=0", [text.mathmode, text.vshift.bottomzero])
c.text(6, 0, r"x=0", [text.mathmode, text.vshift.mathaxis])

c.writeEPSfile("valign")
```



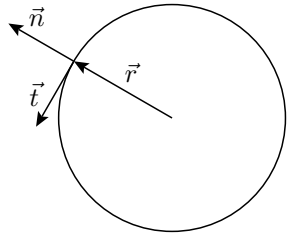
misc/latex

```
from pyx import *

# set properties of the defaulttexrunner, e.g. switch to LaTeX
text.set(mode="latex")

c = canvas.canvas()
# the canvas, by default, uses the defaulttexrunner from the text module
# (this can be changed by the canvas method settexrunner)
c.text(0, 0, r"This is \LaTeX.")

# you can have several texrunners (several running TeX/LaTeX instances)
plaintex = text.texrunner() # plain TeX instance
c.insert(plaintex.text(0, -1, r"This is plain \TeX."))

c.writeEPSfile("latex")
```



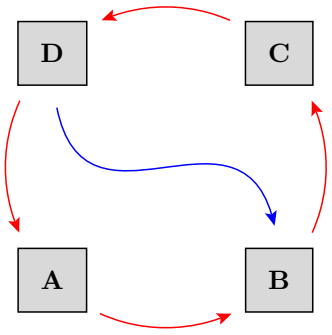
misc/vector

```
from math import pi, sin, cos
from pyx import *

def vector(x1, y1, x2, y2, t, pos=0.5, distance=0.1):
    c = canvas.canvas()
    c.stroke(path.line(x1, y1, x2, y2), [deco.earrow.normal])
    textbox = text.text((1-pos)*x1 + pos*x2, (1-pos)*y1 + pos*y2, t,
                        [text.halign.center, text.vshift.mathaxis])
    if distance < 0:
        textbox.linealign(-distance, y1 - y2, x2 - x1)
    else:
        textbox.linealign(distance, y2 - y1, x1 - x2)
    c.insert(textbox)
    return c

r = 1.5
a = 150

c = canvas.canvas()
dx, dy = cos(a * pi / 180), sin(a * pi / 180)
x, y = r * dx, r * dy
c.stroke(path.circle(0, 0, r))
c.insert(vector(0, 0, x, y, r"$\vec r$"))
c.insert(vector(x, y, x - dy, y + dx, r"$\vec t$", pos=0.7))
c.insert(vector(x, y, x + dx, y + dy, r"$\vec n$", pos=0.7))
c.writeEPSfile("vector")
```



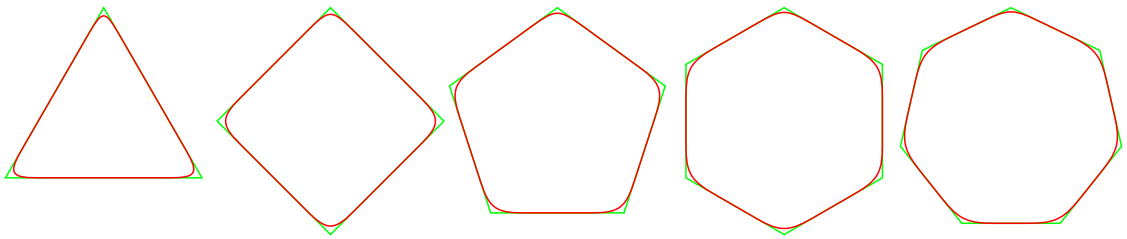
misc/connect

```
from pyx import *
from pyx.connector import arc, curve

unit.set(uscale=3)

c = canvas.canvas()

textattrs = [text.halign.center, text.vshift.middlezero]
A = text.text(0, 0, r"\bf A", textattrs)
B = text.text(1, 0, r"\bf B", textattrs)
C = text.text(1, 1, r"\bf C", textattrs)
D = text.text(0, 1, r"\bf D", textattrs)

for X in [A, B, C, D]:
    c.draw(X.bbox().enlarged(0.1).path(),
        [deco.stroked(), deco.filled([color.grey(0.85)])])
    c.insert(X)

for X,Y in [[A, B], [B, C], [C, D], [D, A]]:
    c.stroke(arc(X, Y, boxdists=0.2), [color.rgb.red, deco.earrow.normal])

c.stroke(curve(D, B, boxdists=0.2, relangle1=45, relangle2=-45, relbulge=0.8),
         [color.rgb.blue, deco.earrow.normal])

c.writeEPSfile("connect")
```



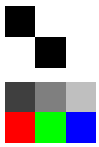
misc/box

```
from math import sin, cos, pi
from pyx import *

r = 1.5

# create a box list of regular polygons
boxes = [box.polygon([(-r*sin(i*2*pi/n), r*cos(i*2*pi/n))
                      for i in range(n)])
         for n in range(3, 8)]
# tile with spacing 0 horizontally
box.tile(boxes, 0, 1, 0)

c = canvas.canvas()
for b in boxes:
    # plot the boxes path
    c.stroke(b.path(), [color.rgb.green])
    # a second time with bezier rounded corners
    c.stroke(b.path(), [deformer.smoothed(radius=0.5), color.rgb.red])
c.writeEPSfile("box")
```



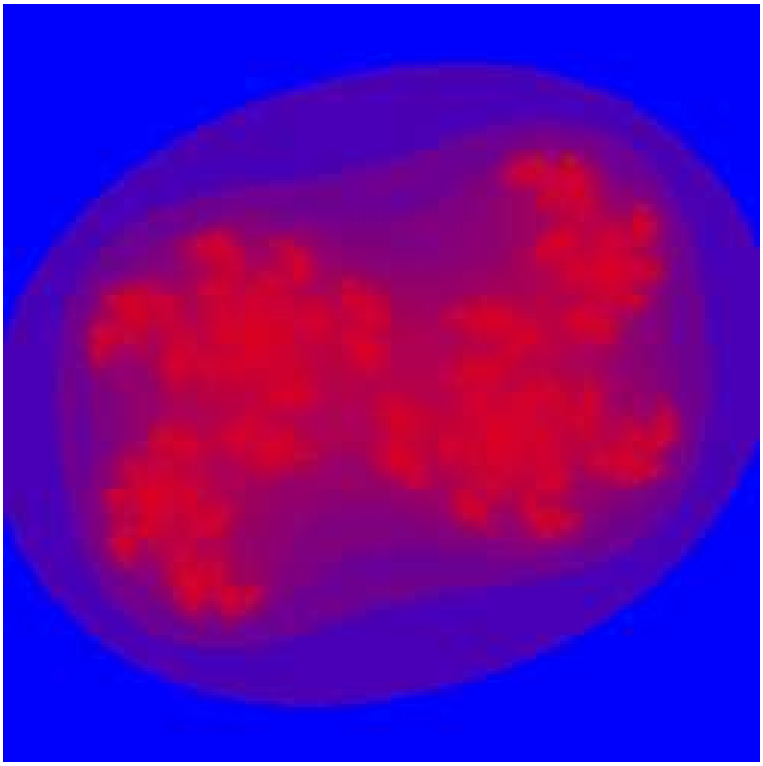
misc/bitmap

```
# This example is identical to the introductory example in the
# bitmap section of the manual. More eye-catchy examples are
# very welcome (BTW not only for this case but in general).

from pyx import *

image_bw = bitmap.image(2, 2, "L", "\0\377\377\0")
image_rgb = bitmap.image(3, 2, "RGB", "\77\77\77\177\177\177\277\277\277"
                                      "\377\0\0\0\377\0\0\0\377")
bitmap_bw = bitmap.bitmap(0, 1, image_bw, height=0.8)
bitmap_rgb = bitmap.bitmap(0, 0, image_rgb, height=0.8)

c = canvas.canvas()
c.insert(bitmap_bw)
c.insert(bitmap_rgb)
c.writeEPSfile("bitmap")
```



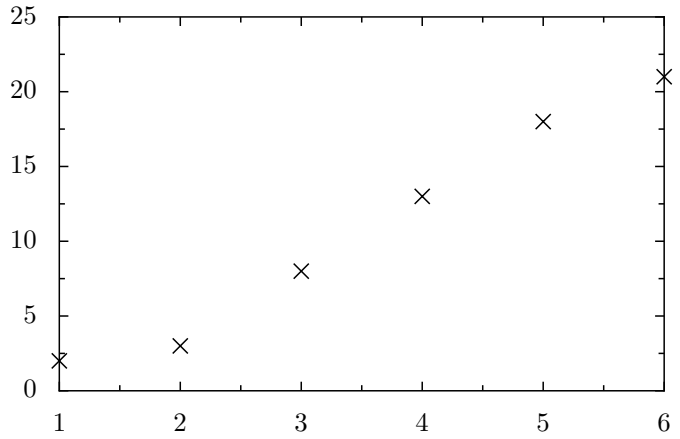
misc/julia

```
# contributed by Stefan Schenk

from cStringIO import StringIO
from math import sqrt
from pyx import *

xiterations = yiterations = 250
Min_Im = -1.5
Max_Im = 1.5
Min_Re = -1.5
Max_Re = 1.5
c = 0.41 + 0.3j
p = color.palette.RedBlue

def rgbcolortostring(c):
    return "".join([chr(int(255*c.color[name])) for name in "rgb"])

data = StringIO()

# compute fractal
for x in range(xiterations):
    for y in range(yiterations):
        z = complex(1.0*(Max_Re-Min_Re)*x/xiterations + Min_Re,
                    1.0*(Max_Im-Min_Im)*y/yiterations + Min_Im)

        for k in range(256):
            z = z*z + c
            if abs(z) > 2:
                # append color(RGB) of the current pixel to the end of data
                data.write(rgbcolortostring(p.getcolor(1.0/sqrt(k+1))))
                break
        else:
            data.write("\0\0\0")

# generate image from data
julia = bitmap.image(xiterations, yiterations, "RGB", data.getvalue())
juliabitmap = bitmap.bitmap(0, 0, julia, height=10)

c = canvas.canvas()
c.insert(juliabitmap)
c.writeEPSfile("julia")
```



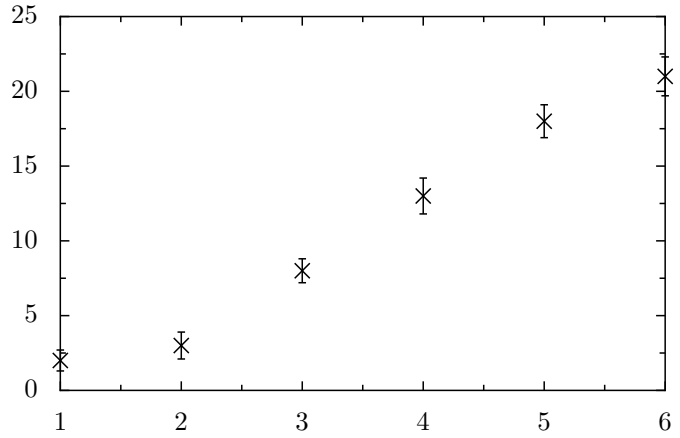
graphs/minimal

```
from pyx import *

g = graph.graphxy(width=8)
g.plot(graph.data.file("minimal.dat", x=1, y=2))
g.writeEPSfile("minimal")

# the file minimal.dat looks like :
# 1 2
# 2 3
# 3 8
# 4 13
# 5 18
# 6 21

# graph styles can be modified by a second parameter to the plot method:
# g.plot(graph.data.file("minimal.dat", x=1, y=2), [graph.style.line()])
```



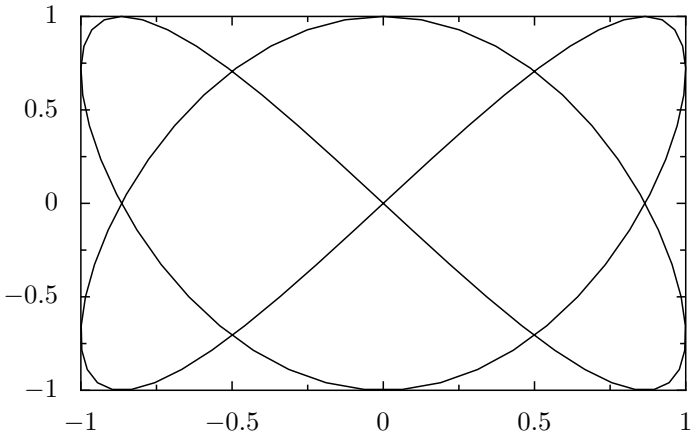
graphs/errorbar

```
from pyx import *

g = graph.graphxy(width=8)
g.plot(graph.data.file("errorbar.dat", x=1, y=2, dy=3),
       [graph.style.symbol(), graph.style.errorbar()])
g.writeEPSfile("errorbar")
```



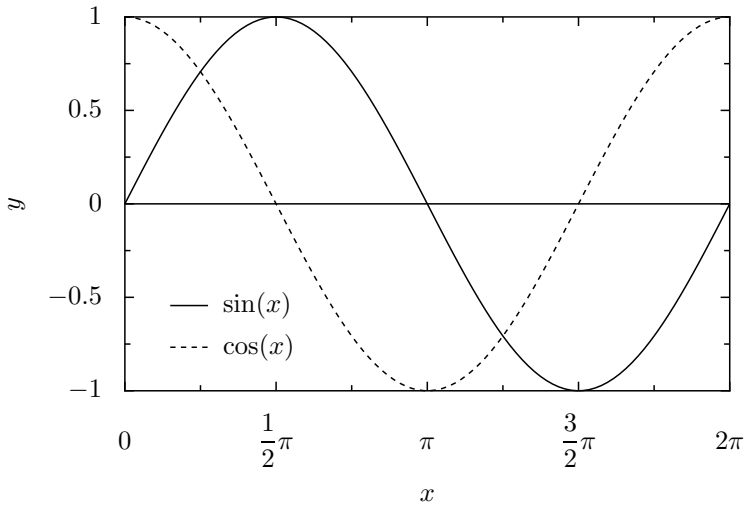
graphs/lissajous

```
from math import pi
from pyx import *

g = graph.graphxy(width=8)
g.plot(graph.data.paramfunction("k", 0, 2*pi, "x, y = sin(2*k), cos(3*k)"))
g.writeEPSfile("lissajous")
```



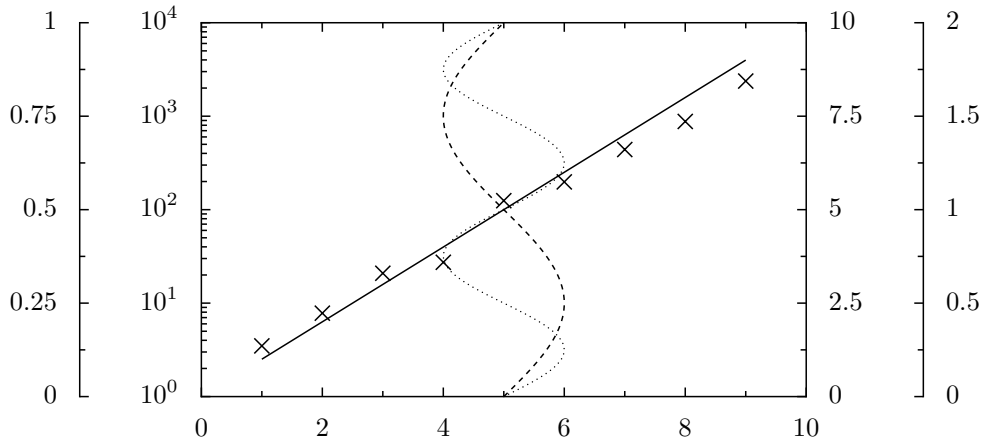
graphs/piaxis

```
from math import pi
from pyx import *
from pyx.graph import axis

g = graph.graphxy(width=8, key=graph.key.key(pos="bl"),
        x=axis.linear(min=0, max=2*pi, title="$x$", divisor=pi,
                      texter=axis.texter.rational(suffix=r"\pi")),
        y=axis.linear(title="$y$"))

g.plot(graph.data.function("y=sin(x)", title=r"$\sin(x)$"))
g.plot(graph.data.function("y=cos(x)", title=r"$\cos(x)$"))

g.finish()
g.stroke(g.ygridpath(0))

g.writeEPSfile("piaxis")
```



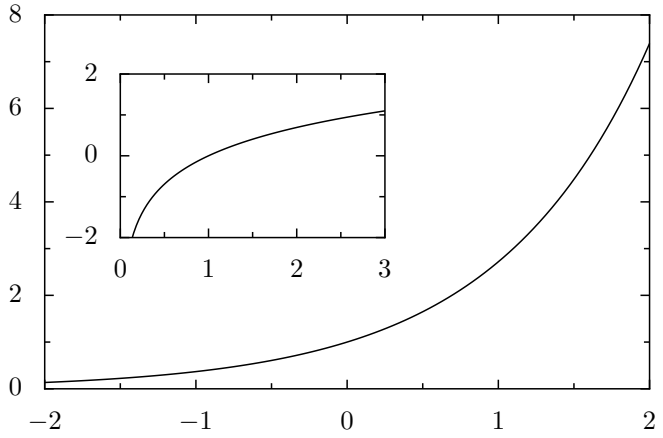
graphs/manyaxes

```
import math, random
from pyx import *

# a xy-graph has linear x and y axes by default
# they might be overwritten and futher axes might be added as well
g = graph.graphxy(width=8, y=graph.axis.log(), y2=graph.axis.lin(),
                  y3=graph.axis.lin(min=0, max=1),
                  y4=graph.axis.lin(min=0, max=2))

# we generate some data and a function with multiple arguments
d = [[i, math.exp(0.8*i+random.random())] for i in range(1,10)]
f = lambda x, a: x*a

g.plot(graph.data.list(d, x=1, y=2))
g.plot(graph.data.function("y2=f(x, 1)", context=locals()))

g.plot(graph.data.function("x=5+sin(2*pi*y3)"))
g.plot(graph.data.function("x=5+sin(2*pi*y4)"))

g.writeEPSfile("manyaxes")
```



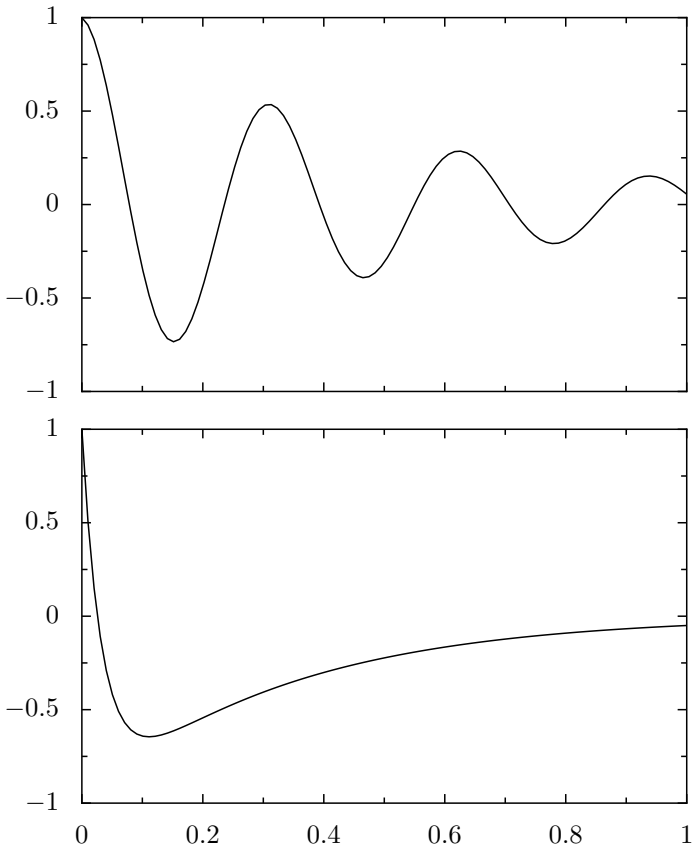
graphs/inset

```
from pyx import *

g = graph.graphxy(width=8, x=graph.axis.linear(min=-2, max=2))
g.plot(graph.data.function("y=exp(x)"))
g2 = g.insert(graph.graphxy(width=3.5, xpos=1, ypos=2,
                            x=graph.axis.linear(min=0, max=3),
                            y=graph.axis.linear(min=-2, max=2)))
g2.plot(graph.data.function("y=log(x)"))
g.writeEPSfile("inset")
```



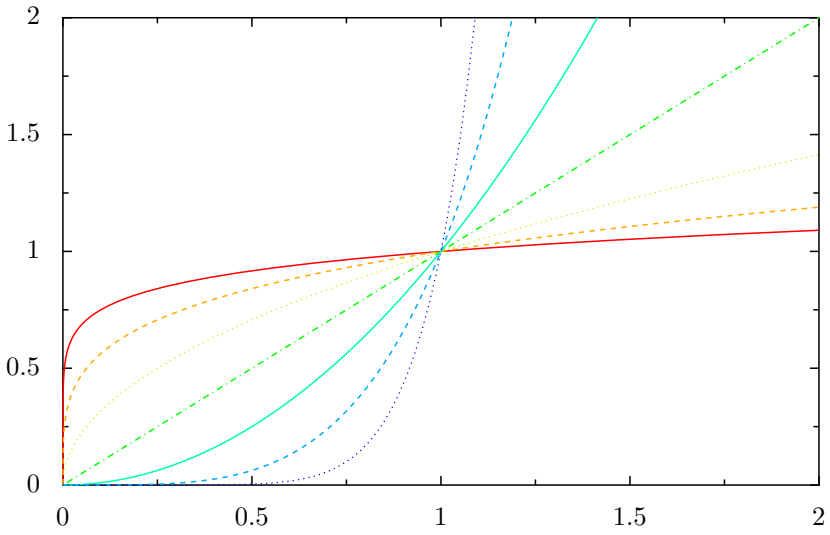
graphs/link

```
import math
from pyx import *

c = canvas.canvas()

g1 = c.insert(graph.graphxy(width=8,
                            x=graph.axis.linear(min=0, max=1)))
g1.plot(graph.data.function("y=2*exp(-30*x)-exp(-3*x)"))

g2 = c.insert(graph.graphxy(width=8, ypos=g1.height+0.5,
                            x=g1.axes["x"].createlinkaxis()))
g2.plot(graph.data.function("y=cos(20*x)*exp(-2*x)"))

c.writeEPSfile("link")
```



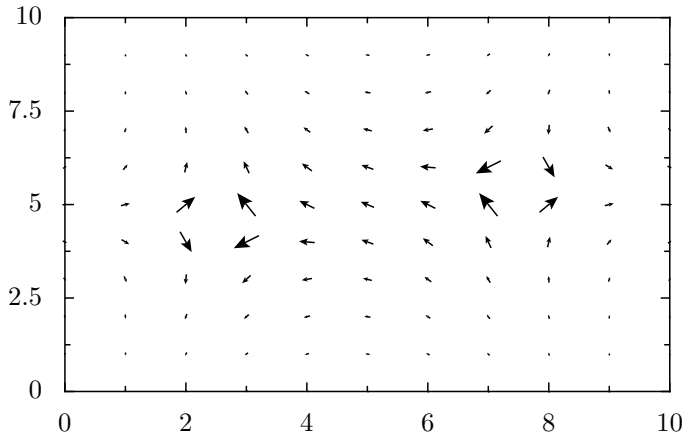
graphs/change

```
from pyx import *

g = graph.graphxy(width=10,
                  x=graph.axis.linear(min=0, max=2),
                  y=graph.axis.linear(min=0, max=2))
g.plot([graph.data.function("x=y**(2**(3-%i))" % i) for i in range(3)] +
       [graph.data.function("y=x**(2**%i)" % i) for i in range(4)],
       [graph.style.line([color.palette.Rainbow])])
g.writeEPSfile("change")
```



graphs/arrows

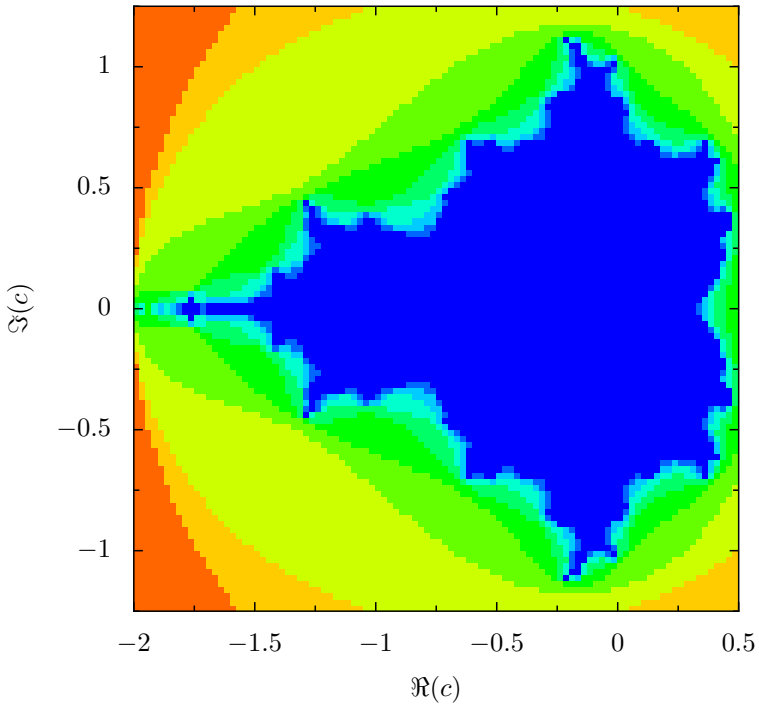
```
from math import pi, atan2
from pyx import *

z1 = 2.5 + 4.5j
z2 = 7.5 + 5.5j

# we abuse a parametric function below, so we express everything in terms of a parameter k
x = lambda k: int(k)/11
y = lambda k: int(k)%11
z = lambda k: x(k) + y(k) * 1j
f = lambda k: 1/(z(k)-z1)/(z(k)-z2)                    # function to be plotted
s = lambda k: 5*abs(f(k))                              # magnitude of function value
a = lambda k: 180/pi*atan2(f(k).imag, f(k).real)       # direction of function value

g = graph.graphxy(width=8,
                  x=graph.axis.linear(min=0, max=10),
                  y=graph.axis.linear(min=0, max=10))
g.plot(graph.data.paramfunction("k", 0, 120,
                                "x, y, size, angle = x(k), y(k), s(k), a(k)",
                                points=121, context=locals()),# access extern
       [graph.style.arrow()])                                 # variables&functions
g.writeEPSfile("arrows")                                      # by passing a context
```



graphs/mandel

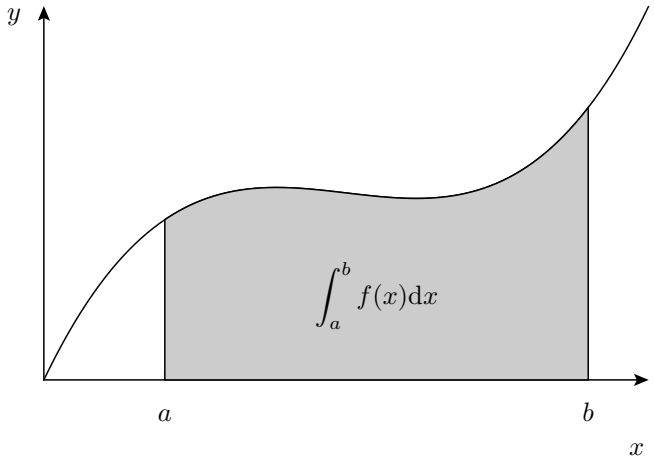
```
# contributed by Stephen Phillips

from pyx import *

# Mandelbrot parameters
re_min = -2
re_max = 0.5
im_min = -1.25
im_max = 1.25
gridx = 100
gridy = 100
max_iter = 10

# Set-up
re_step = (re_max - re_min) / gridx
im_step = (im_max - im_min) / gridy
d = []

# Compute fractal
for re_index in range(gridx):
    re = re_min + re_step * (re_index + 0.5)
    for im_index in range(gridy):
        im = im_min + im_step * (im_index + 0.5)
        c = complex(re, im)
        n = 0
        z = complex(0, 0)
        while n < max_iter and abs(z) < 2:
            z = (z * z) + c
            n += 1
        d.append([re - 0.5 * re_step, re + 0.5 * re_step,
                  im - 0.5 * im_step, im + 0.5 * im_step,
                  float(n)/max_iter])

# Plot graph
g = graph.graphxy(height=8, width=8,
                  x=graph.axis.linear(min=re_min, max=re_max, title=r'$\Re(c)$'),
                  y=graph.axis.linear(min=im_min, max=im_max, title=r'$\Im(c)$'))
g.plot(graph.data.list(d, xmin=1, xmax=2, ymin=3, ymax=4, color=5),
       [graph.style.rect(color.palette.Rainbow)])
g.dodata() # plot data first, then axes
g.writeEPSfile('mandel')
```

graphs/mandel



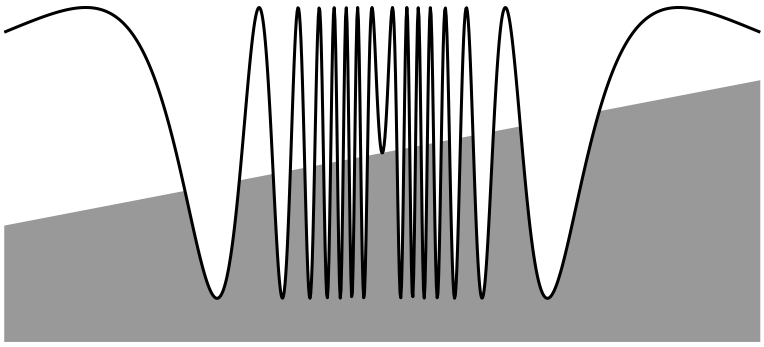
graphs/integral

```
from pyx import *

a, b = 2, 9 # integral area

p = graph.axis.painter.regular(basepathattrs=[deco.earrow.normal],
                               titlepos=0.98, titledirection=None)
ticks = [graph.axis.tick.tick(a, label="$a$"),
         graph.axis.tick.tick(b, label="$b$")]
g = graph.graphxy(width=8, x2=None, y2=None,
                  x=graph.axis.linear(title="$x$", min=0, max=10,
                                      manualticks=ticks,
                                      parter=None, painter=p),
                  y=graph.axis.linear(title="$y$", parter=None, painter=p))
d = g.plot(graph.data.function("y=(x-3)*(x-5)*(x-7)"))
g.finish()
p = d.path # the path is available after the graph is finished

pa = g.xgridpath(a)
pb = g.xgridpath(b)
(splita,), (splitpa,) = p.intersect(pa)
(splitb,), (splitpb,) = p.intersect(pb)
area = (pa.split([splitpa])[0] <<
        p.split([splita, splitb])[1] <<
        pb.split([splitpb])[0].reversed())
area[-1].close()
g.stroke(area, [deco.filled([color.gray(0.8)])])
g.text(g.pos(0.5 * (a + b), 0)[0], 1,
       r"\int_a^b f(x){\rm d}x", [text.halign.center, text.mathmode])
g.writeEPSfile("integral")
```



graphs/partialfill

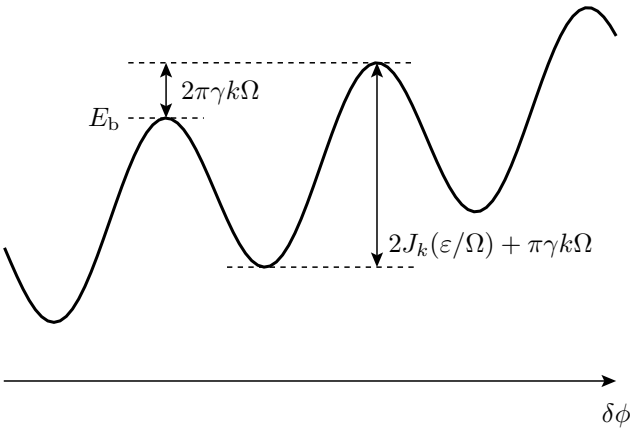
```
# contributed by Michael Schindler

from pyx import *

# get the lines from the graph
xax = graph.axis.linear(min=-1, max=1.0, painter=None)
yax = graph.axis.linear(min=-1.3, max=1.3, painter=None)
g = graph.graphxy(width=10, ratio=2, x=xax, y=yax)
fline = g.plot(graph.data.function("y=sin(1.0/(x**2+0.02122))", points=1000))
horiz = g.plot(graph.data.function("y=0.5*x", points=2))
g.finish()

# convert paths to normpaths (for efficiency reasons only)
fline = fline.path.normpath()
horiz = horiz.path.normpath()
# intersect the lines
splith, splitf = horiz.intersect(fline)

# create gray area (we do not use simple clipping)
area = horiz.split([splith[0]])[0]
for i in range(0, len(splith)-2, 2):
    area = area.joined(fline.split([splitf[i], splitf[i+1]])[1])
    area = area.joined(horiz.split([splith[i+1], splith[i+2]])[1])
area = area.joined(fline.split([splitf[-2], splitf[-1]])[1])
area = area.joined(horiz.split([splith[-1]])[1])
area.append(path.lineto(*g.vpos(1, 0)))
area.append(path.lineto(*g.vpos(0, 0)))
area.append(path.closepath()) # not really needed (filling closes automatically)

c = canvas.canvas()

# draw first the area, then the function
c.fill(area, [color.gray(0.6)])
c.stroke(fline, [style.linewidth.Thick, style.linejoin.round])

c.writeEPSfile("partialfill")
```



graphs/washboard

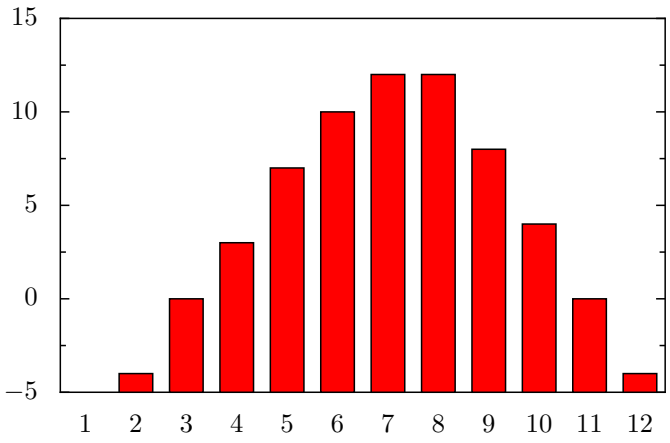
```
# contributed by Sigmund Kohler

from math import pi, cos
from pyx import *
from pyx.deco import barrow, earrow
from pyx.style import linewidth, linestyle
from pyx.graph import graphxy
from pyx.graph.axis import linear
from pyx.graph.axis.painter import regular
from pyx.graph.style import line
from pyx.graph.data import function

mypainter = regular(basepathattrs=[earrow.normal], titlepos=1)
def mycos(x): return -cos(x)+.10*x

g = graphxy(height=5, x2=None, y2=None,
            x=linear(min=-2.5*pi, max=3.3*pi, parter=None,
                     painter=mypainter, title=r"$\delta\phi$"),
            y=linear(min=-2.3, max=2, painter=None))
g.plot(function("y=mycos(x)", context=locals()),
       [line(lineattrs=[linewidth.Thick])])
g.finish()

x1, y1 = g.pos(-pi+.1, mycos(-pi+.1))
x2, y2 = g.pos(-.1, mycos(-.1))
x3, y3 = g.pos(pi+.1, mycos(pi+.1))

g.stroke(path.line(x1-.5, y1, x1+.5, y1), [linestyle.dashed])
g.stroke(path.line(x1-.5, y3, x3+.5, y3), [linestyle.dashed])
g.stroke(path.line(x2-.5, y2, x3+.5, y2), [linestyle.dashed])
g.stroke(path.line(x1, y1, x1, y3), [barrow.normal, earrow.normal])
g.stroke(path.line(x3, y2, x3, y3), [barrow.normal, earrow.normal])
g.text(x1+.2, 0.5*(y1+y3), r"$2\pi\gamma_k\Omega$", [text.vshift.middlezero])
g.text(x1-.6, y1-.1, r"$E_{\rm b}$", [text.halign.right])
g.text(x3+.15, y2+.20, r"$2J_k(\varepsilon/\Omega)+\pi\gamma_k\Omega$")

g.writeEPSfile("washboard")
```

graphs/washboard



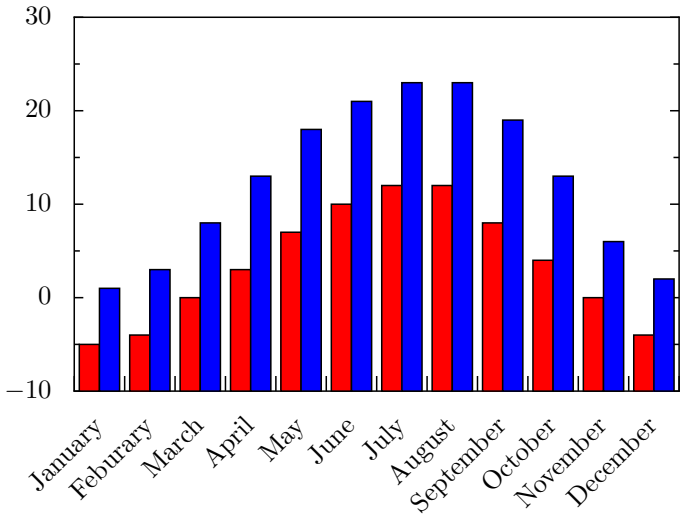
bargraphs/minimal

```
# For a minimal bar plot you have set an bar axis
# in the graph constructor and provide Xname column
# data (X stands for the bar axis to be used).
# Furthermore you need to specify the graph style ,
# since the default graph styles symbol and function
# (depending on the data type) are not appropriate
# for this case.

from pyx import *

g = graph.graphxy(width=8, x=graph.axis.bar())
g.plot(graph.data.file("bar.dat", xname=0, y=2), [graph.style.bar()])
g.writeEPSfile("minimal")
```



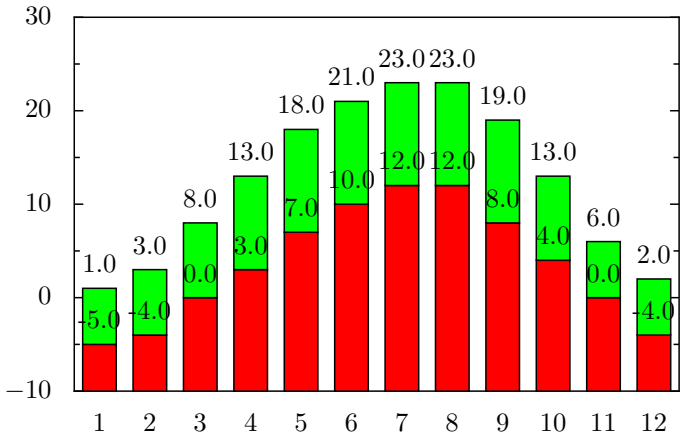
bargraphs/compare

```
# When plotting several bars with the same style in a bar graph,
# they are plotted side by side. You have to create a nested bar
# axis (via subaxis=graph.axis.bar()) to make each position in
# the bar graph to contain another bar axis.

from pyx import *

bap = graph.axis.painter.bar
a = graph.axis.bar(painter=bap(nameattrs=[trafo.rotate(45),
                                          text.halign.right],
                               innerticklength=0.2),
                   subaxis=graph.axis.bar(dist=0))

g = graph.graphxy(width=8, x=a)
g.plot([graph.data.file("bar.dat", xname=1, y=2),
        graph.data.file("bar.dat", xname=1, y=3)],
       [graph.style.bar()])
g.writeEPSfile("compare")
```



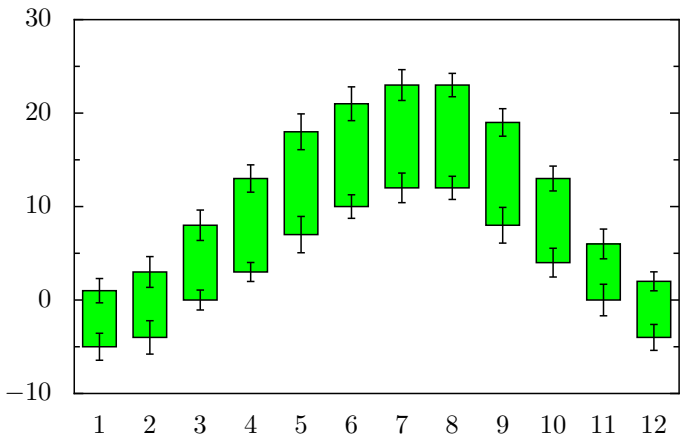
bargraphs/stacked

```
# To stack bars on top of each other, you can add
# stackedbarpos styles and and bars to the styles .
# The stackbarpos need to get different column names
# each time to access new stack data. This example
# also adds text styles to the bars, which just
# repeat the value column data here, but they could
# refer to other columns as well.

from pyx import *

g = graph.graphxy(width=8, x=graph.axis.bar())
g.plot(graph.data.file("bar.dat", xname=0, y=2, stack=3),
       [graph.style.bar(),
        graph.style.text("y"),
        graph.style.stackedbarpos("stack"),
        graph.style.bar([color.rgb.green]),
        graph.style.text("stack")])
g.writeEPSfile("stacked")
```



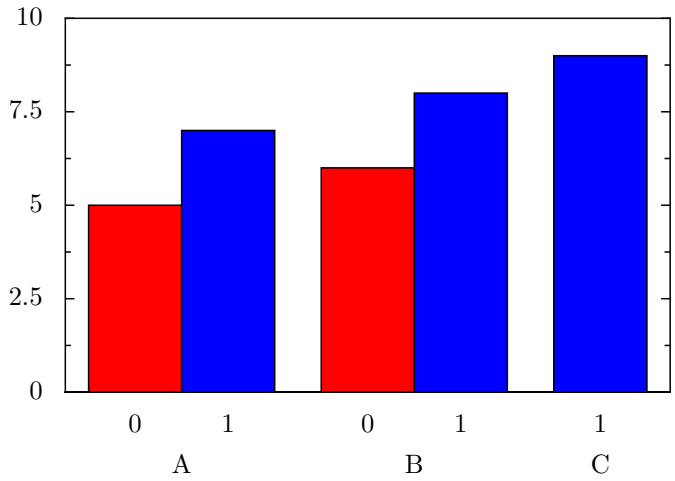
bargraphs/errors

```
# This example shows a bar graph, which starts with
# a stacked bar skipping to plot the original bar.
# This is done by using stackedbarpos before plotting
# a bar with the bar style . However you can still add
# errorbars, even to the lower bound of the bar.
# This example also shows how to handle several errorbars
# in one plot command by the usenames argument of the
# range style.

from random import random
from pyx import *

g = graph.graphxy(width=8, x=graph.axis.bar())
g.plot(graph.data.file("bar.dat", xname=0, y=2, stack=3,
                       dy="1+random()", dstack="1+random()",
                       context={"random": random}),
       [graph.style.errorbar(),
        graph.style.stackedbarpos("stack"),
        graph.style.bar([color.rgb.green]),
        graph.style.range({"y": "stack"}),
        graph.style.errorbar()])
g.writeEPSfile("errors")
```



bargraphs/multisubaxis

```
# A multisubaxis allows for subtitles at a multibar
# plot. Furthermore using multibars a different number
# of subbars per main item becomes possible.

from pyx import *

a = graph.axis.bar(multisubaxis=graph.axis.bar(dist=0))

g = graph.graphxy(width=8, x=a)
g.plot([graph.data.list([["A", 5], ["B", 6]], xname=1, y=2),
        graph.data.list([["A", 7], ["B", 8], ["C", 9]], xname=1, y=2)],
       [graph.style.barpos(fromvalue=0), graph.style.bar()])
g.writeEPSfile("multisubaxis")
```

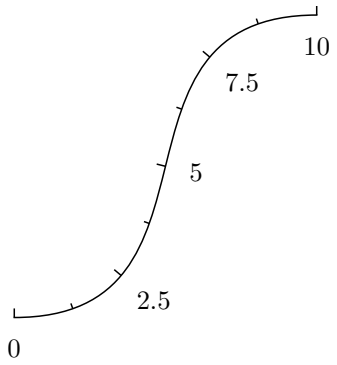


Abstract

This section demonstrates the axis subsystem of the graph module. While here axis are created along paths, all the demonstrated features can be used in graphs as well.

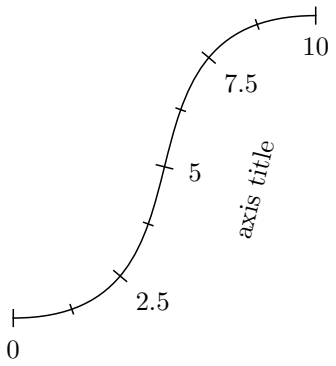
axis/simple

```
# This is the basic example how to draw an axis along an arbitrary
# path. The function pathaxis from the graph.axis module takes a path
# and returns a canvas. Different from the typical usecase in graphs,
# we must fix the axis range by appropriate min and max arguments,
# because of missing data. In graphs the range can be adjusted
# automatically.

from pyx import *

c = graph.axis.pathaxis(path.curve(0, 0, 3, 0, 1, 4, 4, 4),
                        graph.axis.linear(min=0, max=10))
c.writeEPSfile("simple")
```



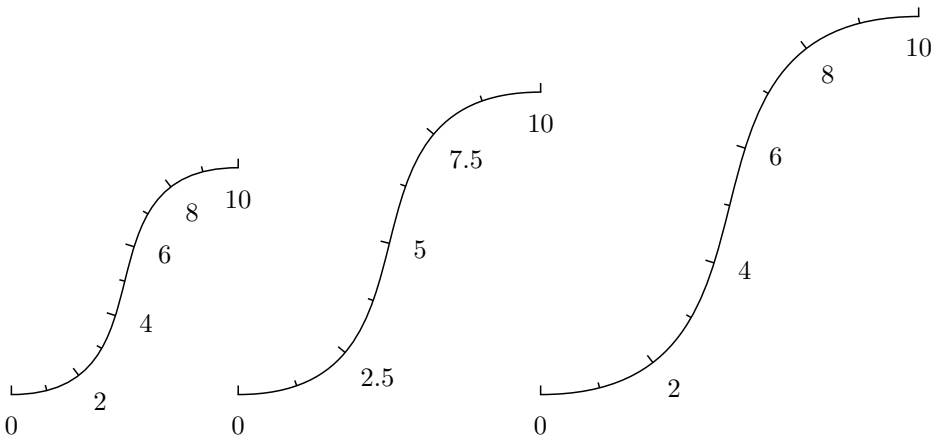
axis/painter

```
# Axis painters performs the painting of an axis. By default, ticks
# are stroked inside of the graph (in the path examples there is no
# graph but don't mind) while labels and the axis title are plotted
# outside. The axis title is rotated along the axis (without writing it
# upside down), while the tick labels are not rotated. The axis painters
# takes a variety of keyword arguments to modify the default
# behaviour.

from pyx import *
from pyx.graph import axis

ap = axis.painter.regular(outerticklength=axis.painter.ticklength.normal)

c = axis.pathaxis(path.curve(0, 0, 3, 0, 1, 4, 4, 4),
                  axis.linear(min=0, max=10, title="axis title",
                              painter=ap))
c.writeEPSfile("painter")
```



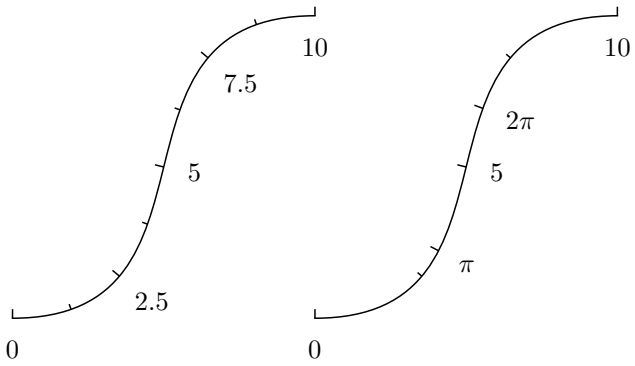
axis/rating

```
# In the example below, several axes with the same parameters are
# plotted on a path scaled in 3 different sizes. Note that the axes
# adjust the ticks appropriately to the available space. The rating
# mechanism takes into account the number of ticks and subticks, but
# also the distances between the labels. Thus, the example in the
# middle has less ticks than the smallest version, because there is
# not enough room for labels with a decimal place.
#
# The rating mechanism is configurable and exchangeable by the axis
# keyword argument "rater". Instead of reconfiguring the rating
# mechanism, simple adjustments to favour more or less ticks are
# possible by the axis keyword argument "density".

from pyx import *
from pyx.graph import axis

p = path.curve(0, 0, 3, 0, 1, 4, 4, 4)

c = canvas.canvas()
c.insert(axis.pathaxis(p.transformed(trafo.translate(-4, 0).scaled(0.75)),
                       axis.linear(min=0, max=10)))
c.insert(axis.pathaxis(p, axis.linear(min=0, max=10)))
c.insert(axis.pathaxis(p.transformed(trafo.scale(1.25).translated(4, 0)),
                       axis.linear(min=0, max=10)))
c.writeEPSfile("rating")
```



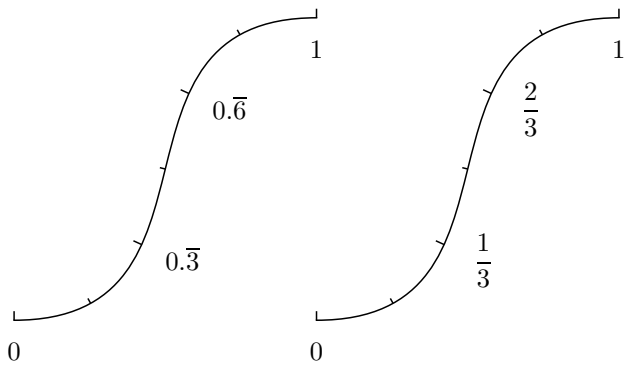
axis/manualticks

```
# Ticks can be set manually in combination with automatically created
# ticks. Note that the rating takes into account the manual ticks as
# well.

import math
from pyx import *
from pyx.graph import axis

p = path.curve(0, 0, 3, 0, 1, 4, 4, 4)

myticks = [axis.tick.tick(math.pi, label="\pi", labelattrs=[text.mathmode]),
           axis.tick.tick(2*math.pi, label="2\pi", labelattrs=[text.mathmode])]

c = canvas.canvas()
c.insert(axis.pathaxis(p, axis.linear(min=0, max=10)))
c.insert(axis.pathaxis(p.transformed(trafo.translate(4, 0)),
                       axis.linear(min=0, max=10, manualticks=myticks)))
c.writeEPSfile("manualticks")
```



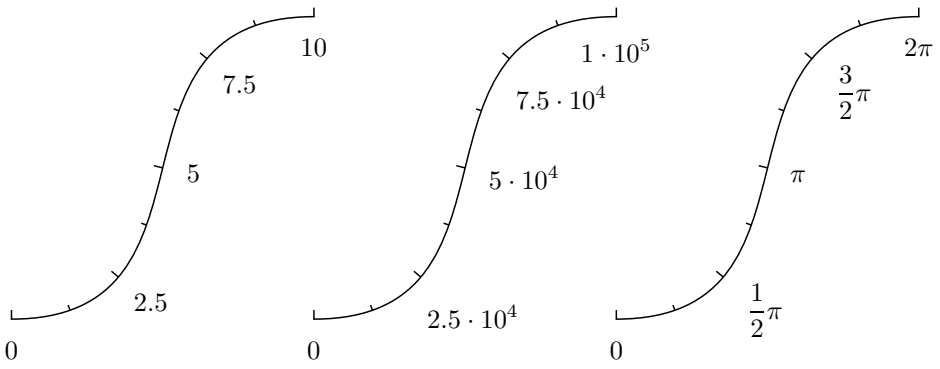
axis/parter

```
# Partitioners (in the code the short form parter is used) take
# care of calculating appropriate tick positions for a given axis
# range. Automatic partitioners create several tick lists , which are
# rated by an axis rater instance afterwards while manual partitioners
# create a single tick list only, which thus doesn't need to be rated.
#
# Note that the partitioning uses fractional number arithmetics. For
# that, tick instances can be initialized with floats using a fixed
# precision but also with strings as shown.

import math
from pyx import *
from pyx.graph import axis

p = path.curve(0, 0, 3, 0, 1, 4, 4, 4)

myparter = axis.parter.linear(["1/3", "1/6"])

c = canvas.canvas()
c.insert(axis.pathaxis(p, axis.linear(min=0, max=1, parter=myparter)))
c.insert(axis.pathaxis(p.transformed(trafo.translate(4, 0)),
                       axis.linear(min=0, max=1, parter=myparter,
                                   texter=axis.texter.rational())))
c.writeEPSfile("parter")
```



axis/texter

```
# Texters create the label strings written to the ticks. There are
# texters available for decimal numbers without and with an
# exponential part as well as fractions. Internally, the partitioning
# is based on fractions to avoid any rounding problems.
#
# Although we could modify axis.linear into a piaxis "inplace", we
# define a special piaxis below to give an impression, how easy
# alternative default settings can be implemented. A more advanced
# task would be to add an appropriate special partitioner for a
# piaxis.

import math
from pyx import *
from pyx.graph import axis

class piaxis(axis.linear):

    def __init__(self, divisor=math.pi,
                 texter=axis.texter.rational(suffix="\pi"), **kwargs):
        axis.linear.__init__(self, divisor=divisor, texter=texter, **kwargs)


p = path.path(path.moveto(0, 0), path.curveto(3, 0, 1, 4, 4, 4))

c = canvas.canvas()
c.insert(axis.pathaxis(p, axis.linear(min=0, max=10)))
c.insert(axis.pathaxis(p.transformed(trafo.translate(4, 0)),
                       axis.linear(min=0, max=1e5)))
c.insert(axis.pathaxis(p.transformed(trafo.translate(8, 0)),
                       piaxis(min=0, max=2*math.pi)))
c.writeEPSfile("texter")
```



axis/log

```
# Certainly logarithmic axes are supported in PyX. By playing with
# partitioners and texters, you can easily change the base.
#
# It is left as an exercise to the reader to create a automatic
# partitioner for logarithmic axes with base 2.

import math
from pyx import *
from pyx.graph import axis

p = path.curve(0, 0, 3, 0, 1, 4, 4, 4)

log2parter = axis.parter.log([axis.parter.preexp([axis.tick.rational(1)], 4),
                              axis.parter.preexp([axis.tick.rational(1)], 2)])
log2texter = axis.texter.exponential(nomantissaexp=r"{2^{%s}}",
                                     mantissamax=axis.tick.rational(2))

c = canvas.canvas()
c.insert(axis.pathaxis(p, axis.log(min=1, max=1024)))
c.insert(axis.pathaxis(p.transformed(trafo.translate(4, 0)),
                       axis.log(min=1, max=1024, parter=log2parter)))
c.insert(axis.pathaxis(p.transformed(trafo.translate(8, 0)),
                       axis.log(min=1, max=1024, parter=log2parter,
                                texter=log2texter)))
c.writeEPSfile("log")
```