Grafica in Python

Alcuni esempi per l'uso di librerie grafiche per il linguaggio Python

Marco Liverani
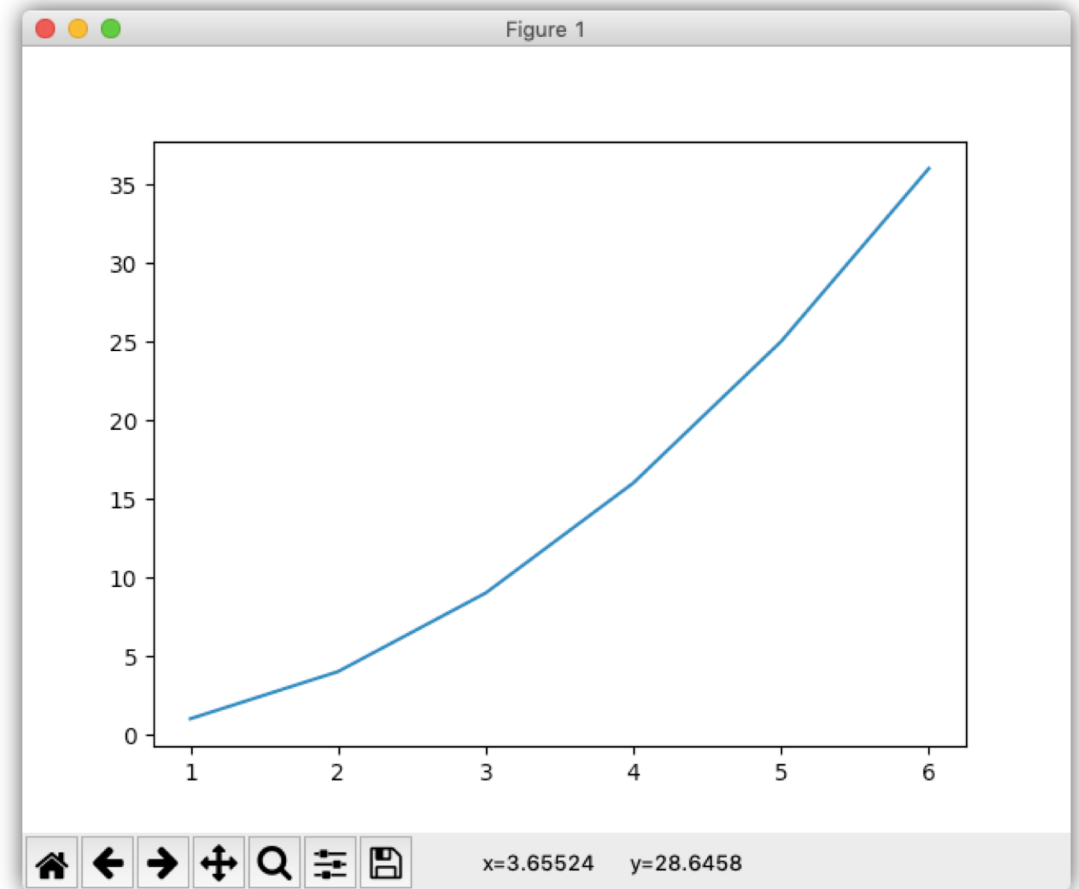
Corso IN440 – Ottimizzazione Combinatoria

http://www.mat.uniroma3.it/users/liverani/IN440/
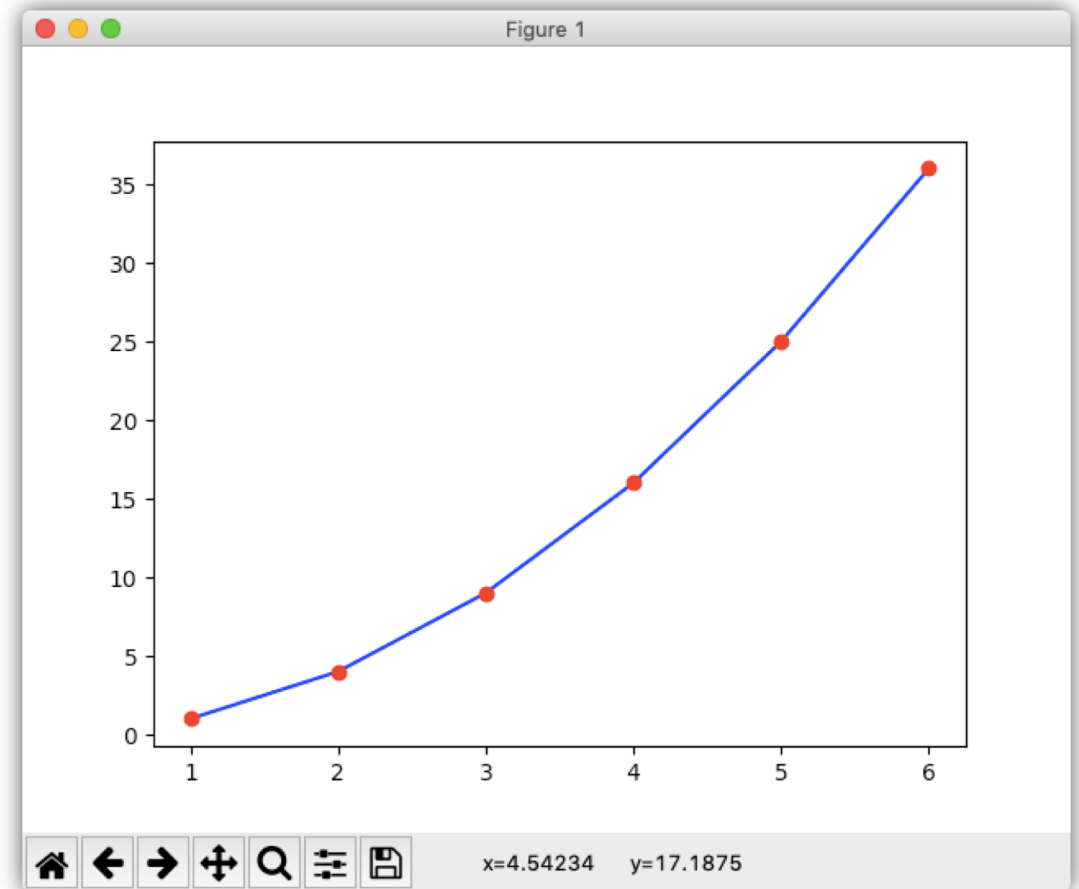
Il modulo «pylab» della libreria MatPlotLib

```python
import matplotlib.pylab as pl
x = [1, 2, 3, 4, 5, 6]
y = [1, 4, 9, 16, 25, 36]
pl.plot(x, y)
pl.show()
```
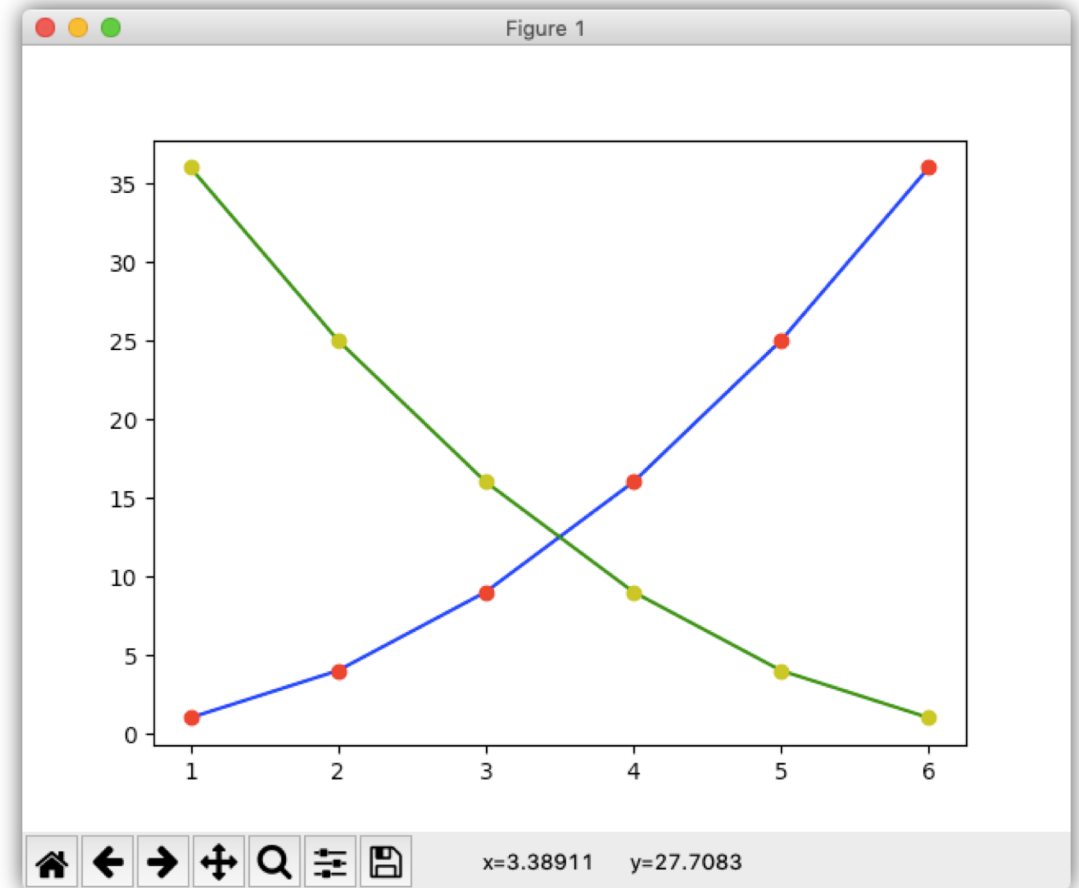
Per la libreria **MatPlotLib** vedi:

`https://matplotlib.org`

Il modulo «pylab» della libreria MatPlotLib

```python
import matplotlib.pylab as pl
x = [1, 2, 3, 4, 5, 6]
y = [1, 4, 9, 16, 25, 36]
pl.plot(x, y, "b-")
pl.plot(x, y, "ro")
pl.show()
```
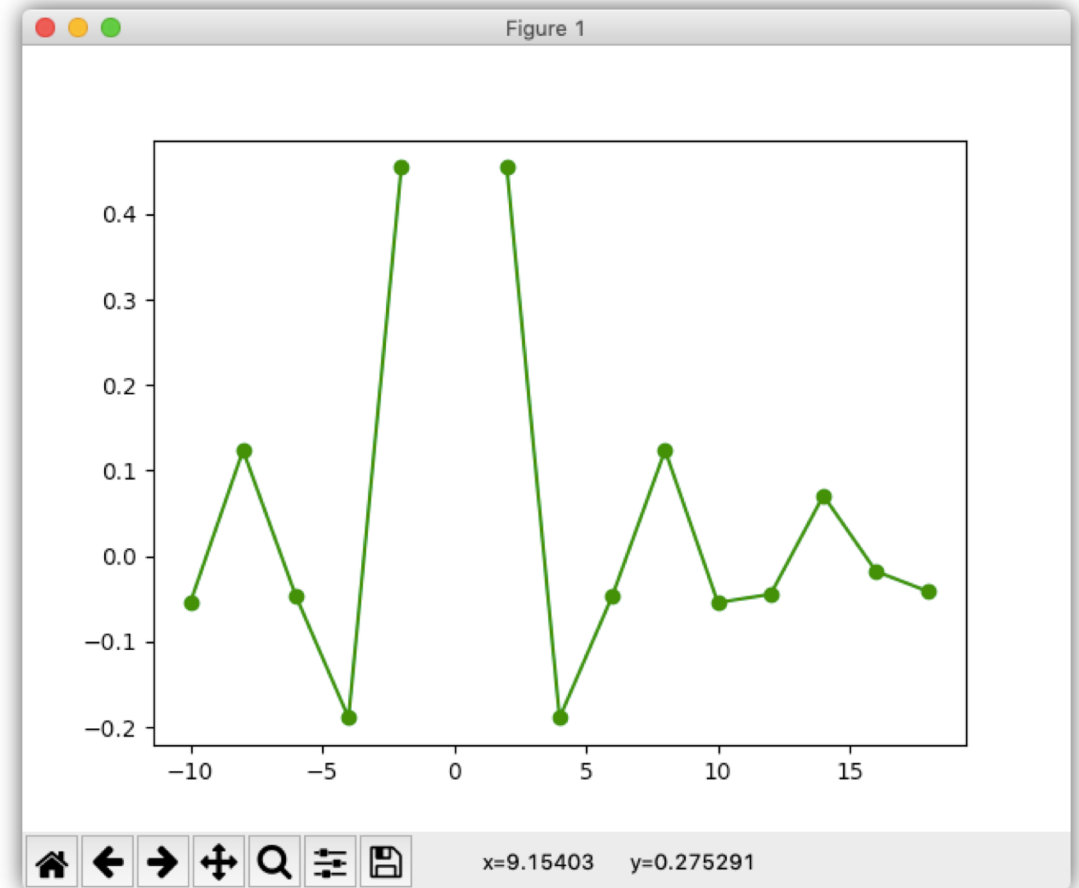
Il modulo «pylab» della libreria MatPlotLib

```python
import matplotlib.pylab as pl
x = [1, 2, 3, 4, 5, 6]
y = [1, 4, 9, 16, 25, 36]
pl.plot(x, y, "b-")
pl.plot(x, y, "ro")
y = [36, 25, 16, 9, 4, 1]
pl.plot(x,y,"g-")
pl.plot(x,y,"yo")
pl.show()
```
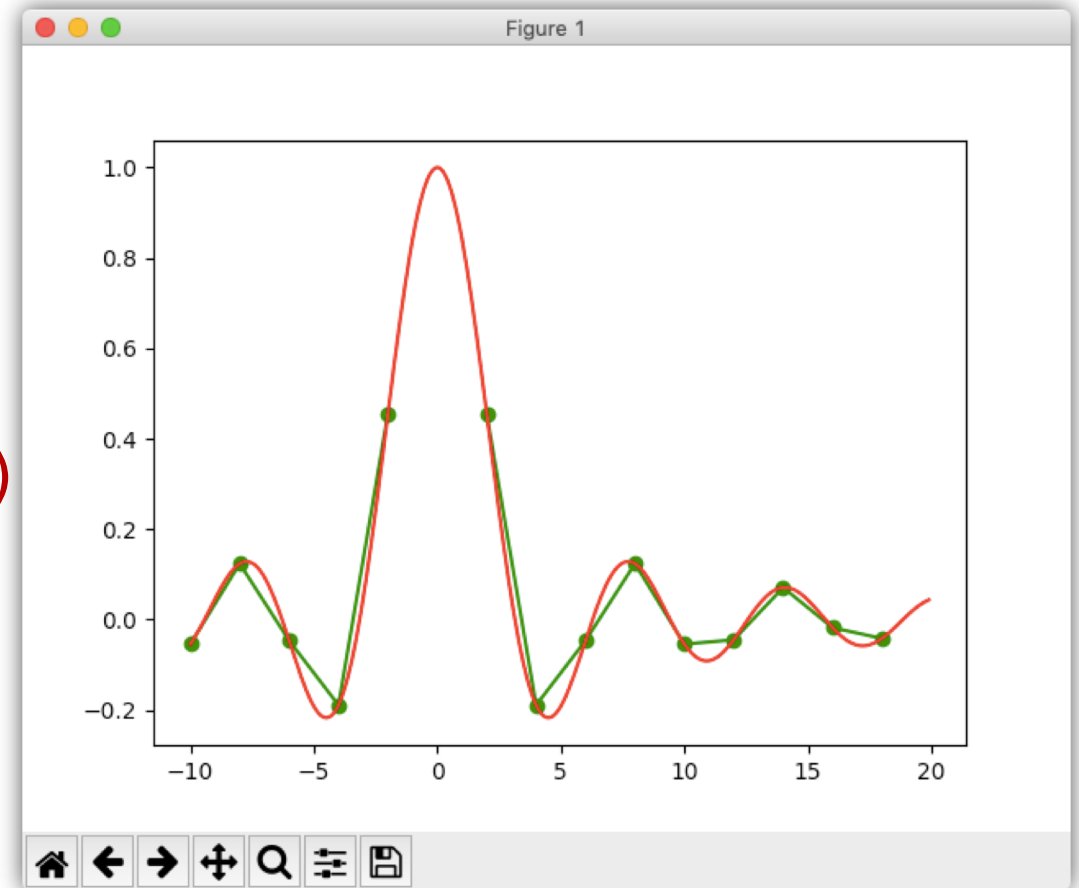
Il modulo «pylab» della libreria MatPlotLib | Grafici di funzione

```python
import matplotlib.pylab as pl
import numpy as np
x = np.arange(-10, 20, 2)
y = np.sin(x)/x
pl.plot(x, y, "g")
pl.plot(x, y, "go")
pl.show()
```
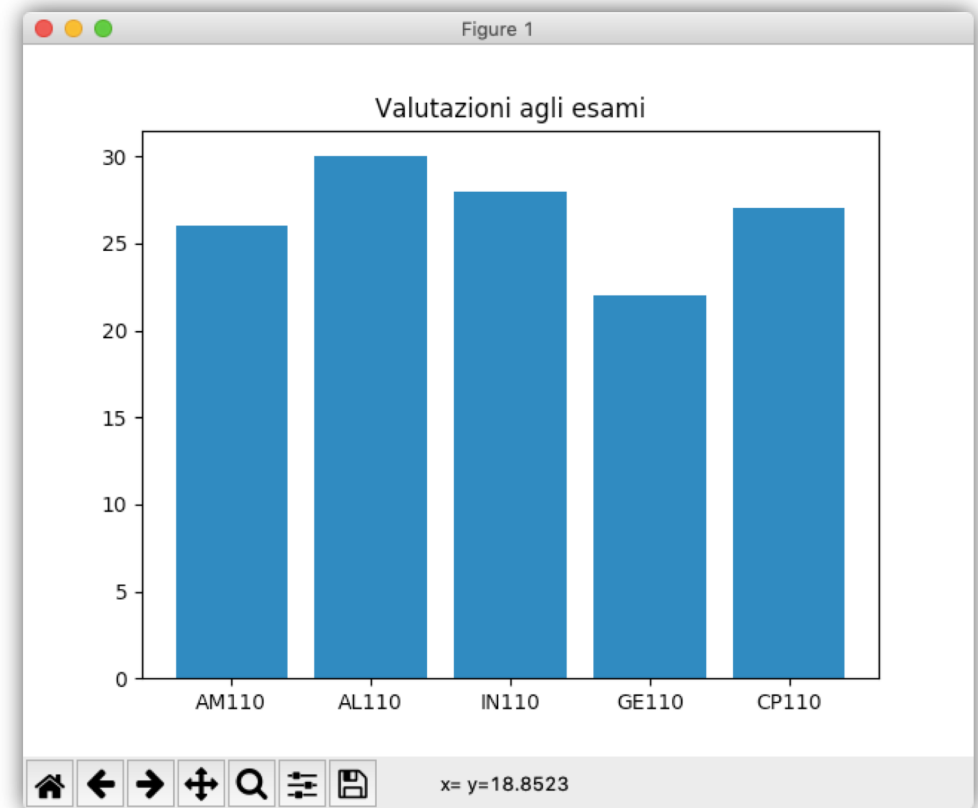
Il modulo «pylab» della libreria MatPlotLib | Grafici di funzione

```python
import matplotlib.pylab as pl
import numpy as np
x = np.arange(-10, 20, 2)
y = np.sin(x)/x
pl.plot(x, y, "g")
pl.plot(x, y, "go")
x = np.arange(-10, 20, 0.1)
y = np.sin(x)/x
pl.plot(x, y, "r")
pl.show()
```
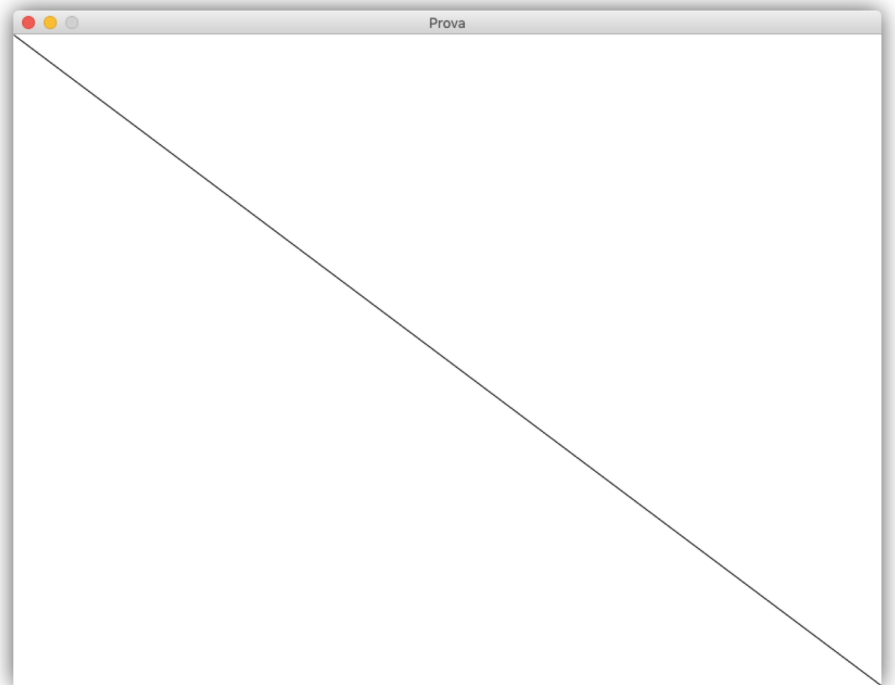
Il modulo «pyplot» della libreria MatPlotLib | Diagrammi a barre

```python
import matplotlib.pyplot as plt
esami = {'AM110':26, 'AL110':30, 'IN110':28, 'GE110':22, 'CP110':27}
plt.bar(list(esami.keys()), list(esami.values()))
plt.title("Valutazioni agli esami")
plt.show()
```

Il modulo «graphics»

```
from graphics import *
win = GraphWin("Prova", 800, 600)
a = Line(Point(0,0), Point(800,600))
a.draw(win)
win.getMouse()
```


Per la libreria **Graphics** vedi:

https://mcsp.wartburg.edu/zelle/python/graphics/graphics.pdf

Il modulo «graphics»

```
from graphics import *
win = GraphWin("Prova", 800, 600)
a = Line(Point(0,0), Point(800,600))
a.draw(win)
win.getMouse()
a = Circle(Point(400,300), 100)
a.draw(win)
win.getMouse()
```
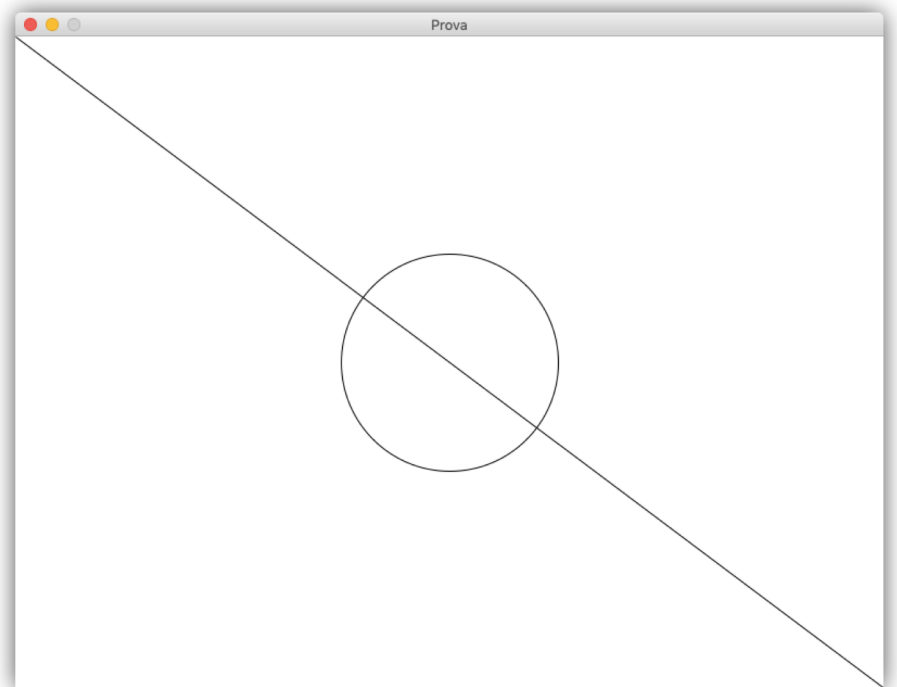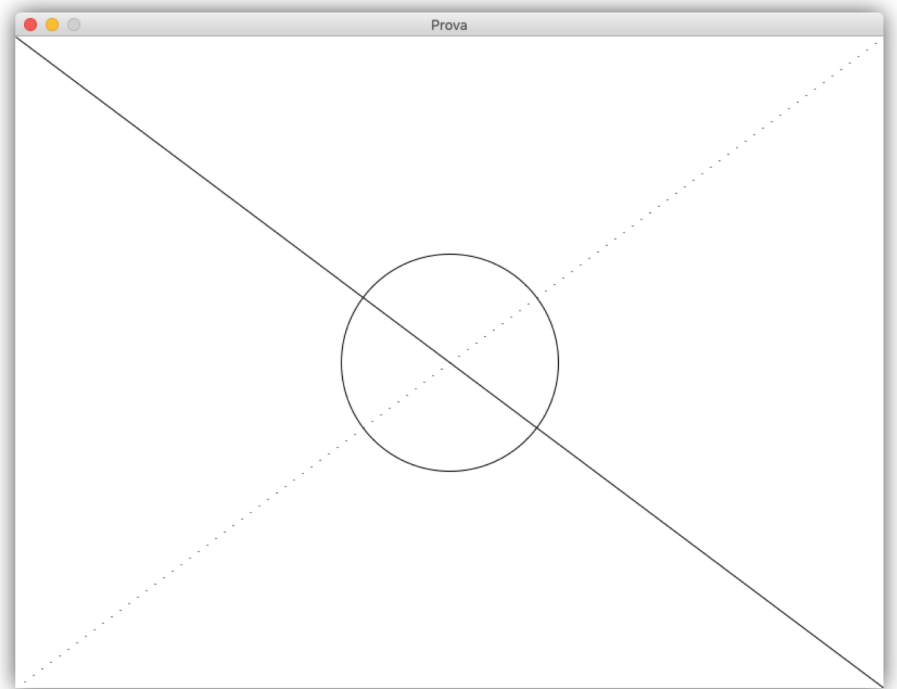
Il modulo «graphics»

```python
from graphics import *
win = GraphWin("Prova", 800, 600)
a = Line(Point(0,0), Point(800,600))
a.draw(win)
win.getMouse()
a = Circle(Point(400,300), 100)
a.draw(win)
win.getMouse()
for i in range(100):
    win.plot(800-i*8, i*6)
win.getMouse()
win.close()
```
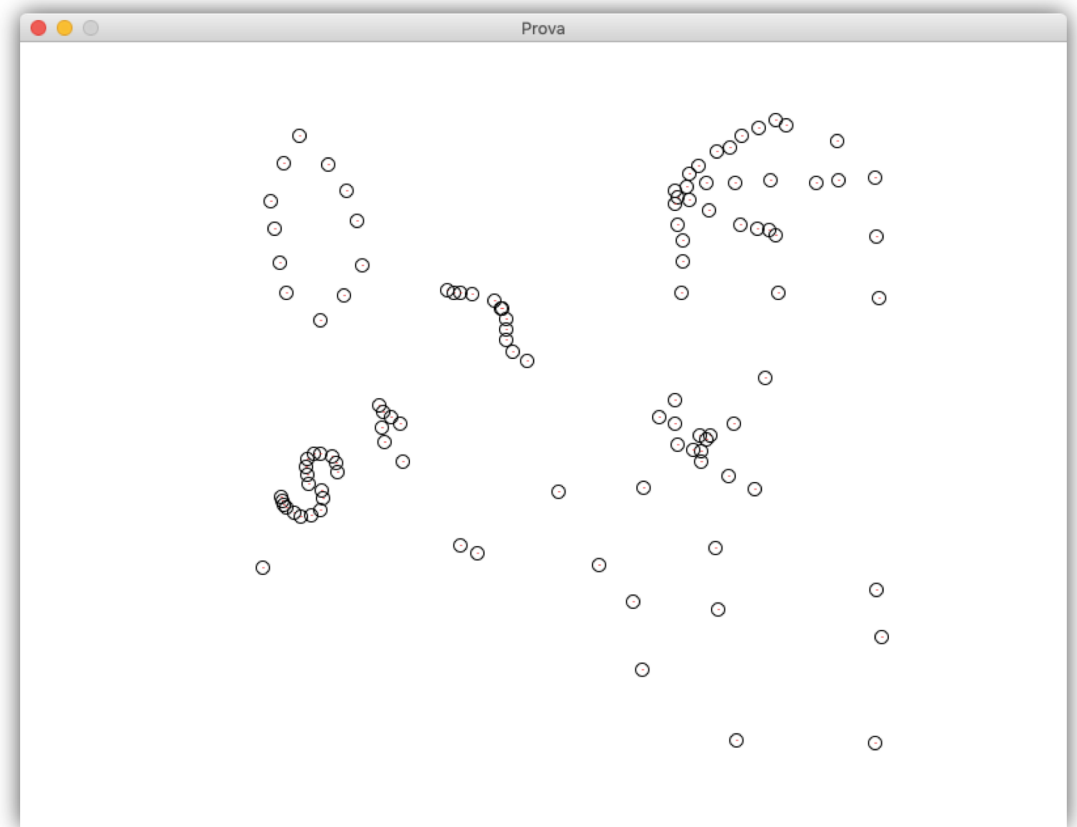
Il modulo «graphics»


```python
from graphics import *
win = GraphWin("Prova", 800, 600)
while 1:
    point=win.getMouse()
    win.plot(point.getX(), point.getY(), 'red')
    c = Circle(point, 5)
    c.draw(win)
win.close()
```
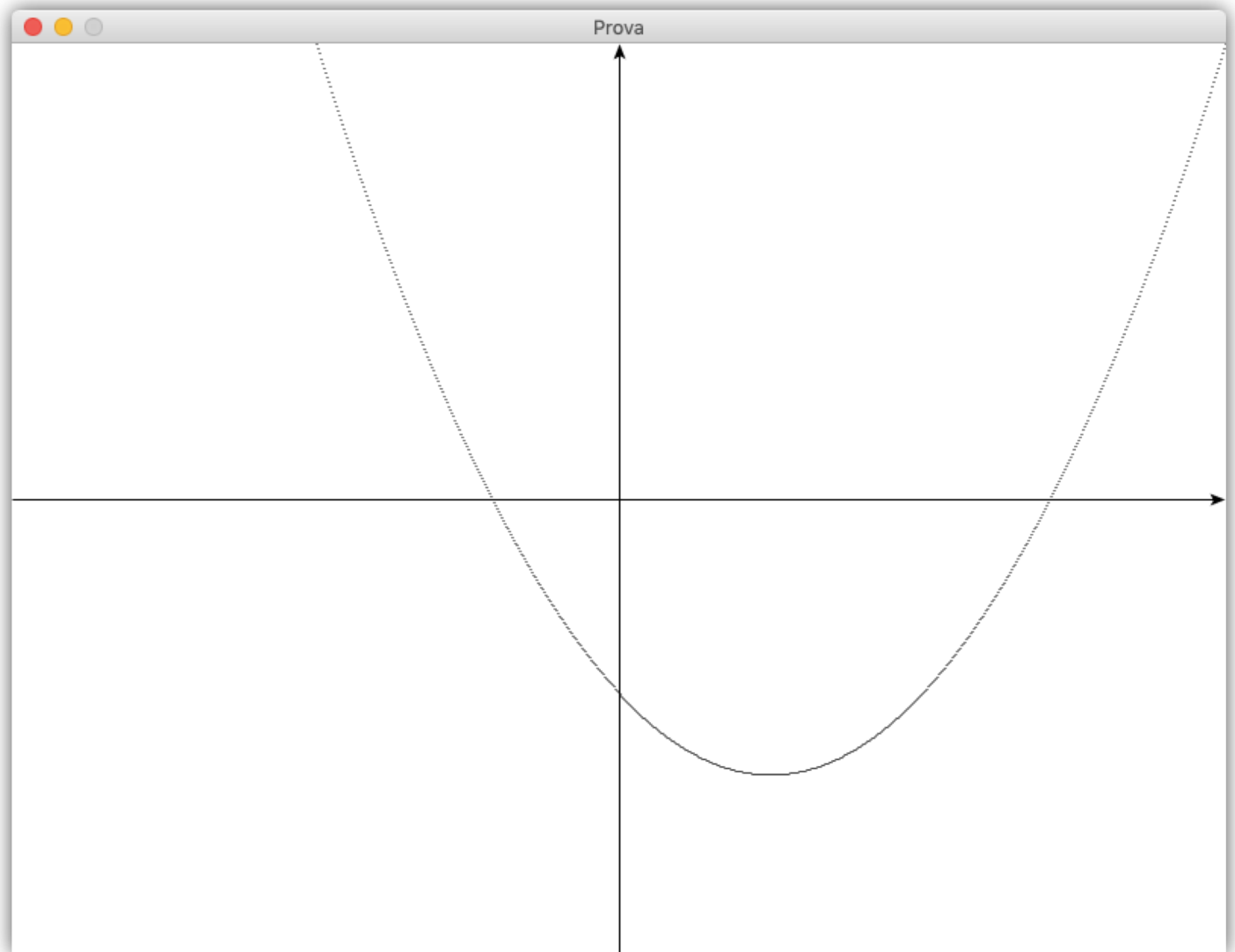
Il modulo «graphics»

```python
from graphics import *

def f(x):
    return(x**2 / 5 - x - 3)


win = GraphWin("Prova", 800, 600)
win.setCoords(-10, -7, 10, 7)
ax = Line(Point(-10,0), Point(10,0))
ax.setArrow("last")
ax.draw(win)
ay = Line(Point(0,-7), Point(0,7))
ay.setArrow("last")
ay.draw(win)
dx = 20/800
x = -10
for i in range(800):
    x = x + dx
    y = f(x)
    win.plot(x,y)
win.getMouse()
win.close()
```
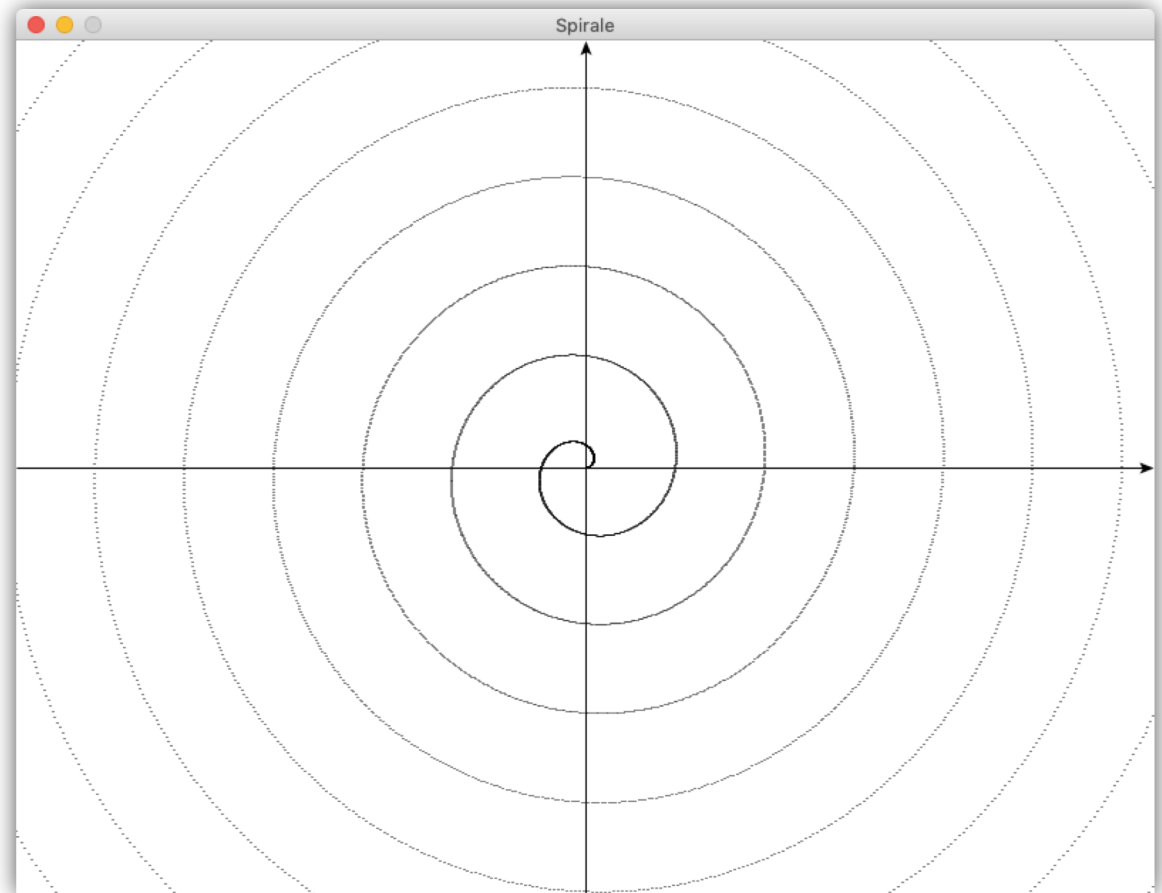
Il modulo «graphics» – Grafico di una spirale

```python
from graphics import *
import numpy as np
win = GraphWin("Spirale", 800, 600)
win.setCoords(-400, -300, 400, 300)
ax = Line(Point(-400,0), Point(400,0))
ax.setArrow("last")
ax.draw(win)
ay = Line(Point(0,-300), Point(0,300))
ay.setArrow("last")
ay.draw(win)

for t in range(10000):
    x = t/10 * np.cos(t/100)
    y = t/10 * np.sin(t/100)
    win.plot(x,y)

win.getMouse()
win.close()
```
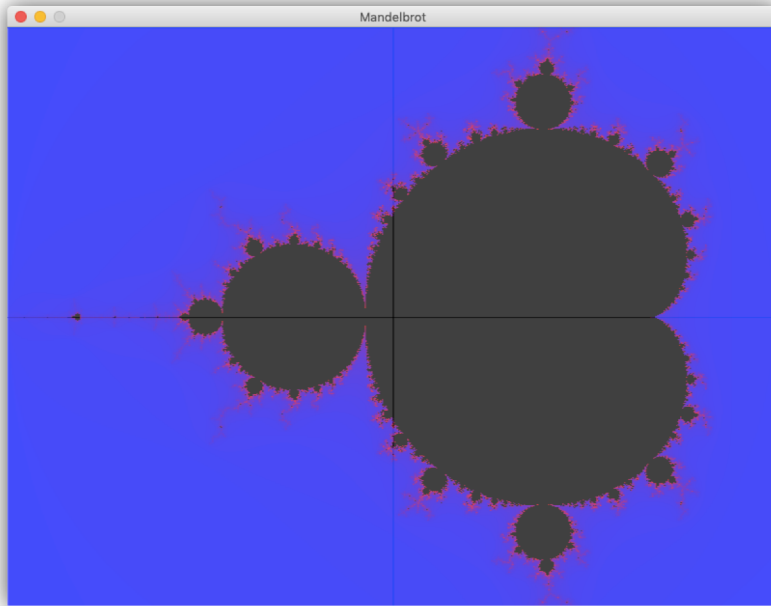
Il modulo «graphics» – Insieme di Mandelbrot

```python
from graphics import *
import numpy as np

def punto(re, im, zre0, zim0, maxCicli):
    zre = zre0
    zim = zim0
    k = 0
    while zre**2+zim**2<=4.0 and k<maxCicli:
        temp = zre**2 - zim**2 +re
        zim = 2.0*(zim*zre) + im
        zre = temp
        k = k+1
    return k
```



```python
win = GraphWin("Mandelbrot", 800, 600, autoflush=False)
win.setCoords(-2, -1.0, 0.7, 1.0)
max = 100

deltaRe = float(2.7/800.0)
deltaIm = float(2.0/600.0)
cre = -2
while cre < 0.7:
    cim = 2
    while cim > -1:
        c = punto(cre, cim, 0, 0, max)
        if c >= max:
            win.plot(cre,cim,color_rgb(0,0,0))
        else:
            win.plot(cre,cim,color_rgb(int(255*c/max), 0,
            255-int(255*c/max)))
        cim = cim-deltaIm
    cre = cre+deltaRe
    update()

win.getMouse()
win.close()
```