用 VPython 學 Python

Apua, PyConTW 2013

About Myself

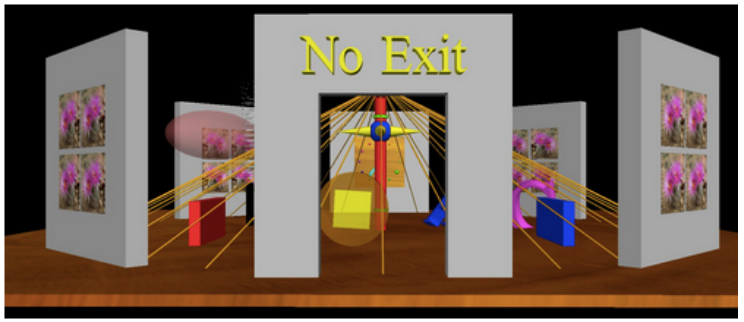
- Name: 阮晉嘉 ~~軟禁家~~
- ID: Apua
- a Python lover
- a FreeBSD newbie
- a system administrator
- ~~one line code in Python is cool !!!!~~

```
for i in range(1,101):print('FizzBuzz','Buzz','Fizz',i)[(i%3>0)|(i%5>0)
<<1]
```

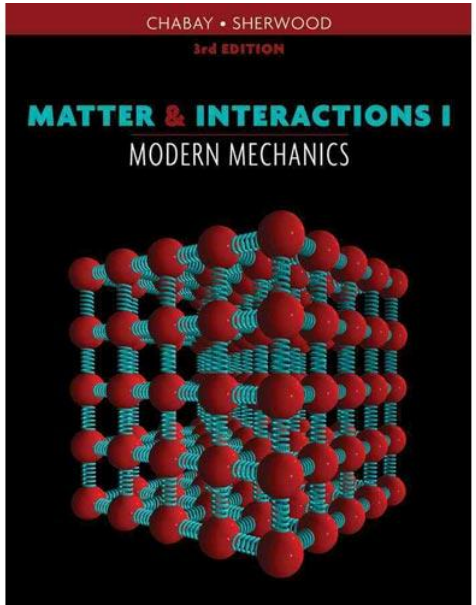
Learning Python

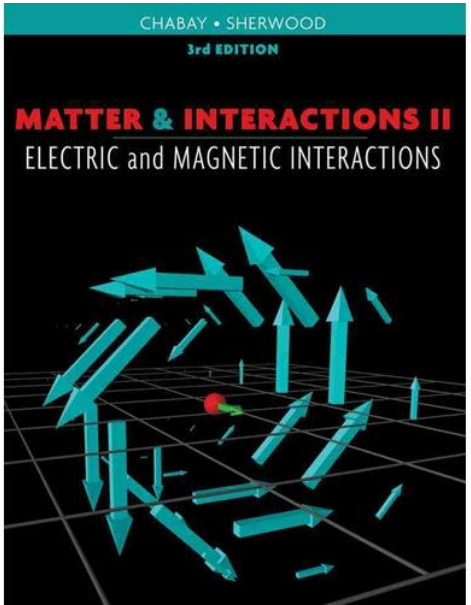
```
>>> print "Hello, world!"

>>> p=sys.stdout.write
>>> p("Hello, world!\n")

>>> # -*- coding=utf8 -*-
>>> print u"哈囉, 沃爾德!"
```

VPython 6.05

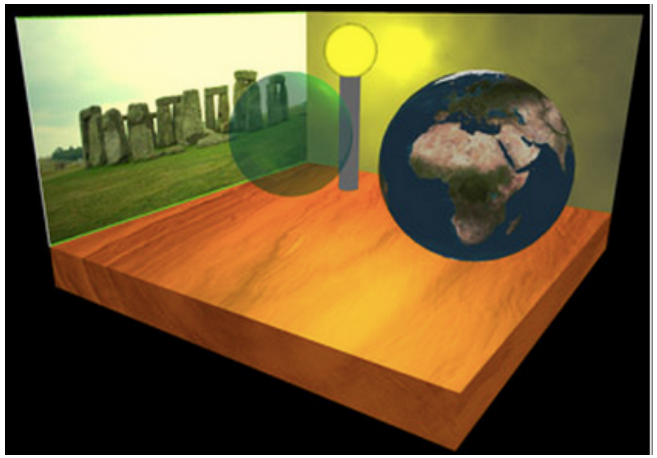


- Visual Python
- by CMU David Scherer
  and NCSU Bruce Sherwood
- for science education and research
  "Matter & Interactions" -> "Lecture-demo"

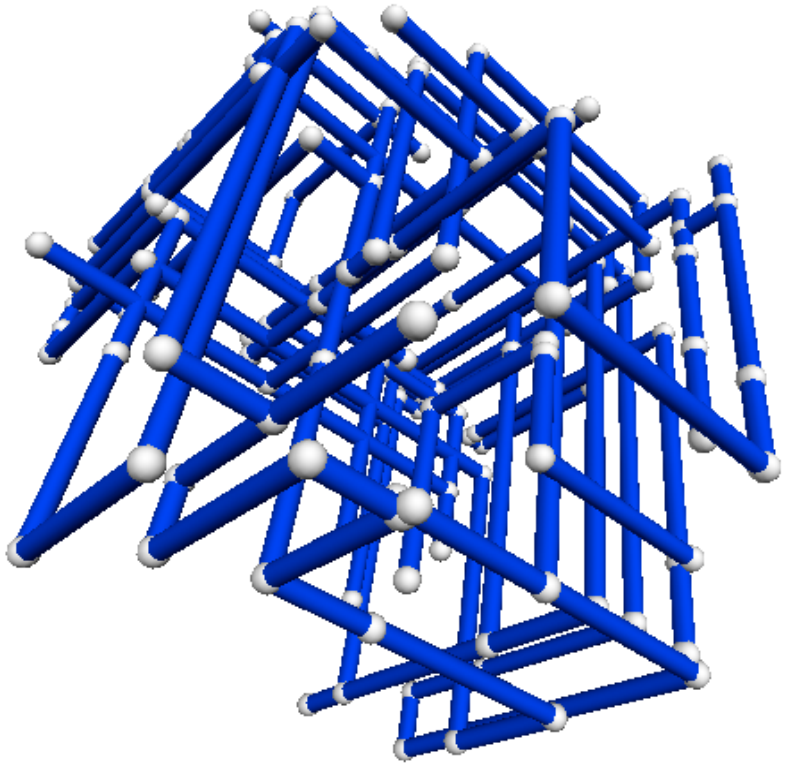


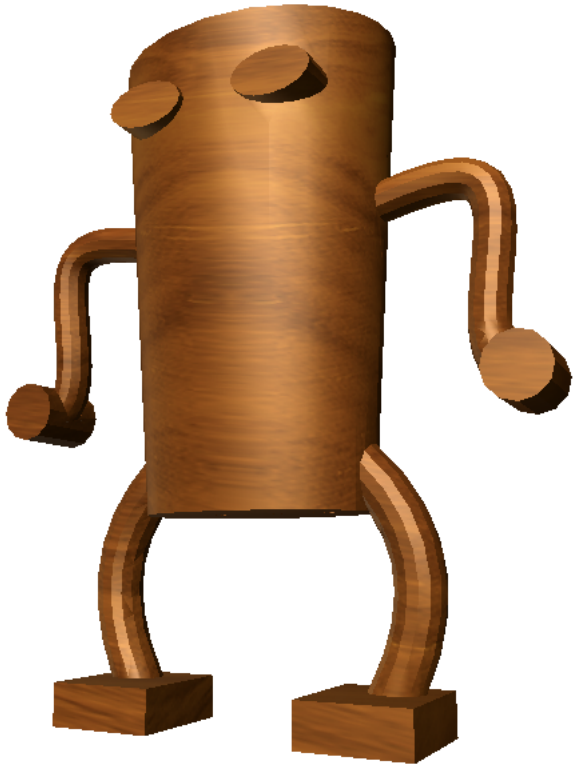


Resource



- official documentation
- user-contributed programs
- `site-packages/visual/example`

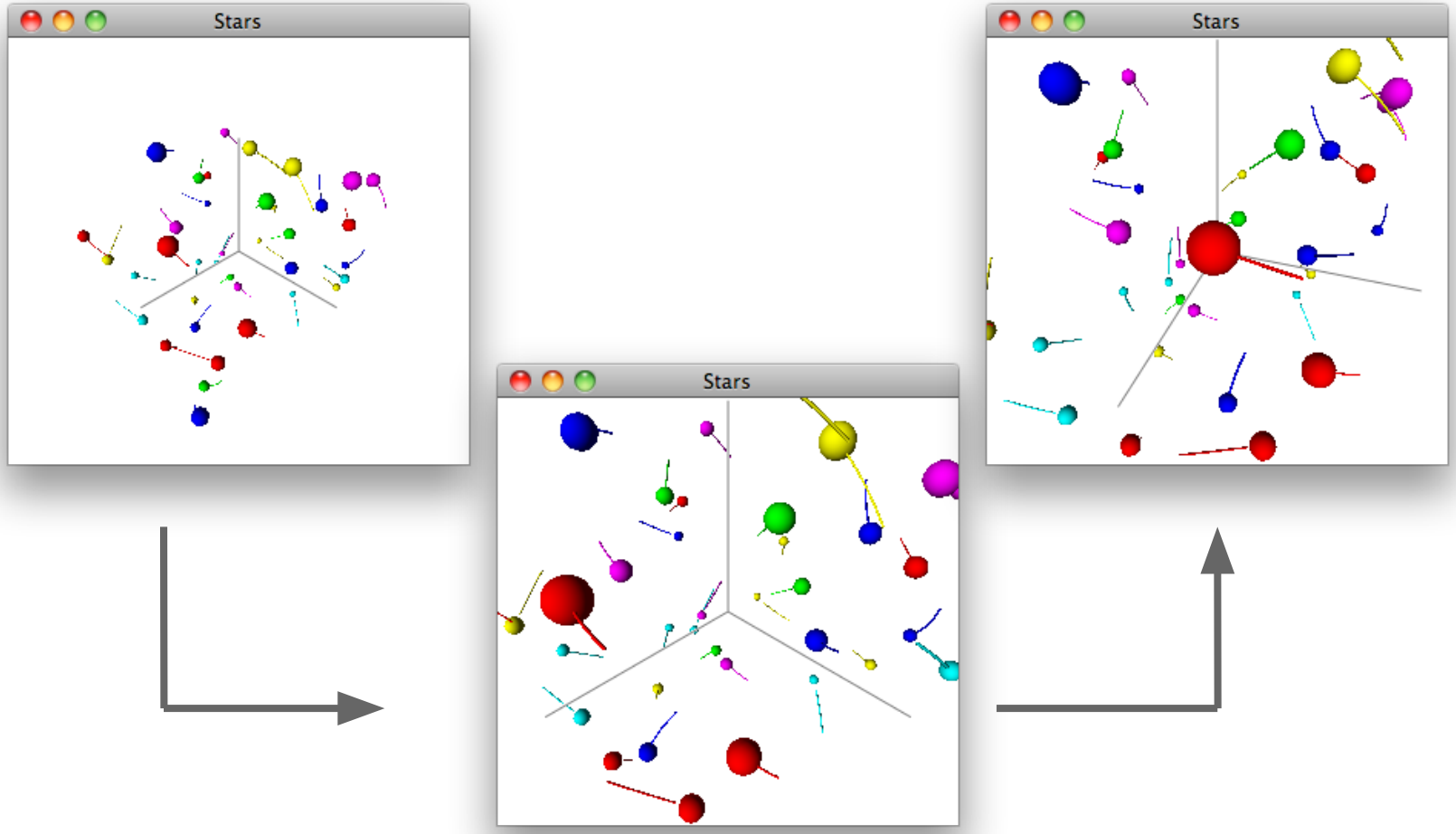




Import Package

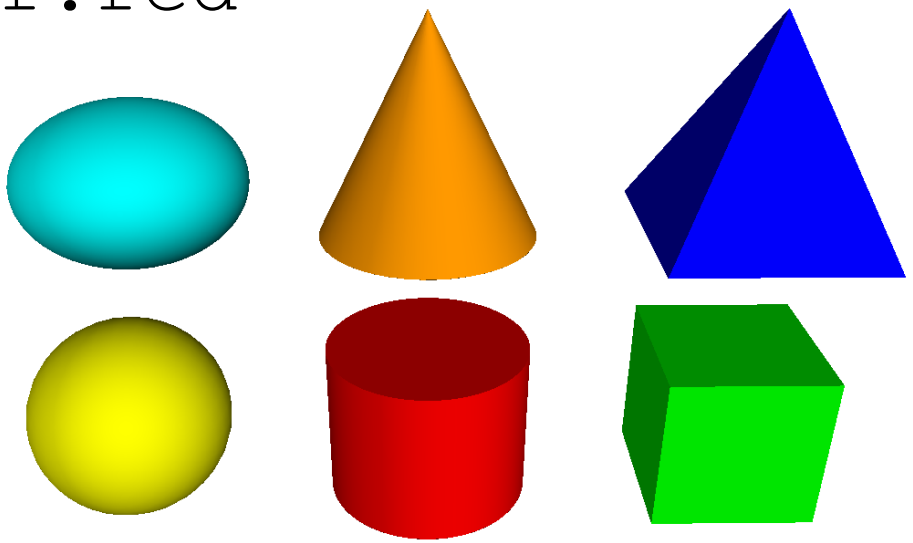
```
import vis
vis.sphere()

from visual import *
vector(0,1,0)    # VPy obj
zeros((3,3))     # NumPy obj
pi               # math module
sleep(10)        # time module
```

Interactive Models

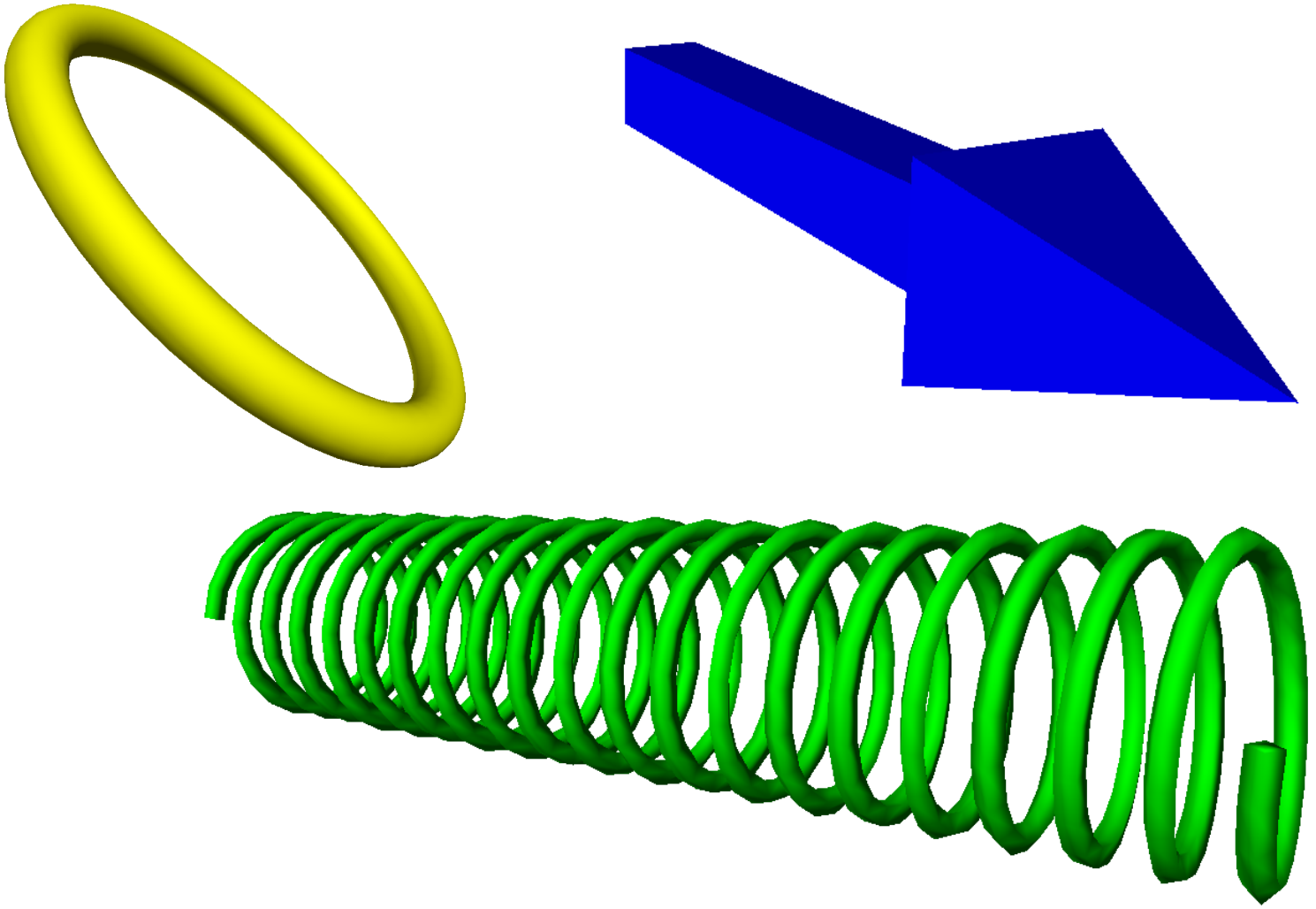


Geometrical Objects

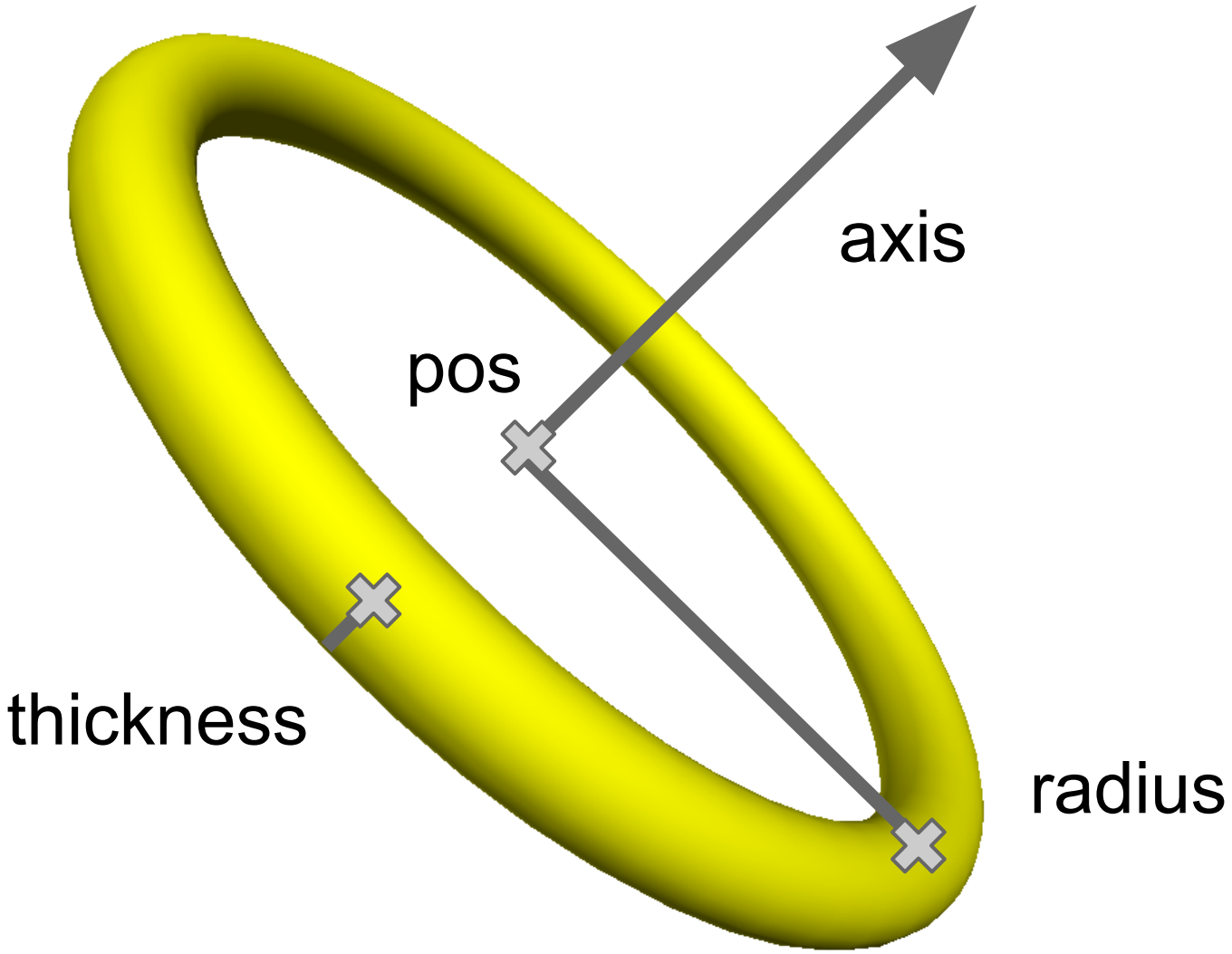
```
s = sphere(color=color.red,
                        x=1,y=2,radius=3)
s = sphere()
s.color = color.red
s.radius = 3
s.pos = 1,2
```



Another Objects

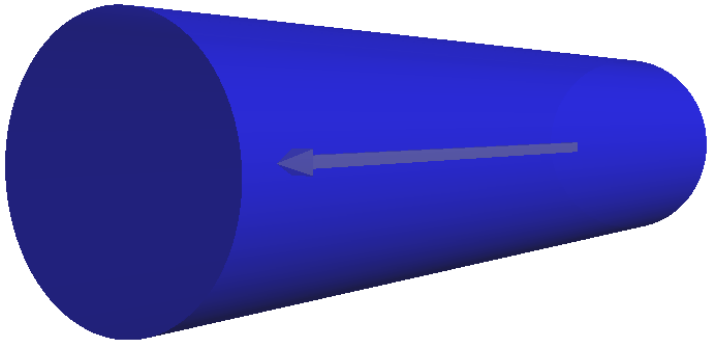


Attributes



Color, Opacity, and Materials

```
c.color = color.blue
c.opacity = 0.7
```



```
w.material = mateirals.wood
```

Animation: move

```
from __future__ import division
from visual import *
N = Rate = 100
s = sphere(pos=(1,0,0))
while 1:
  rate(N)
  s.x = s.x*cos(pi/N)-s.y*sin(pi/N)
  s.y = s.y*cos(pi/N)+s.x*sin(pi/N)
```

Animation rotate

```
from visual import *
a = arrow(axis=(1,0,0))
while 1:
  rate(1)
  a.rotate(axis=(0,0,1),
           angle=-2*pi/60)
```

Picking a Object

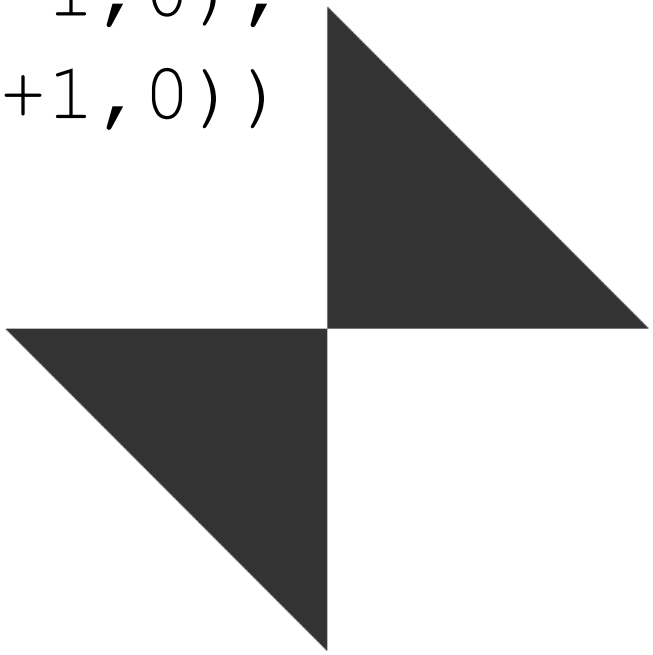
```
while 1:
   if scene.mouse.events:
      evt = scene.mouse.getevent()
      picking_pos = evt.pickpos
      picked_obj  = evt.pick
```

demo: Hanoi

demo: Greedy Snake

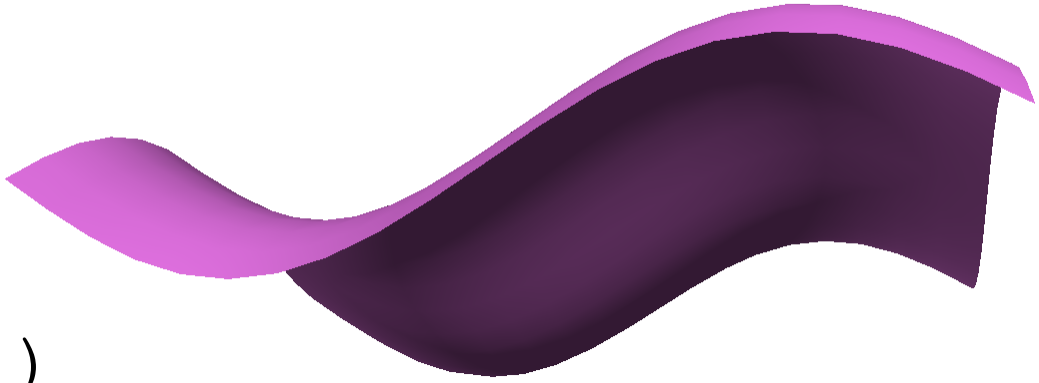
Faces

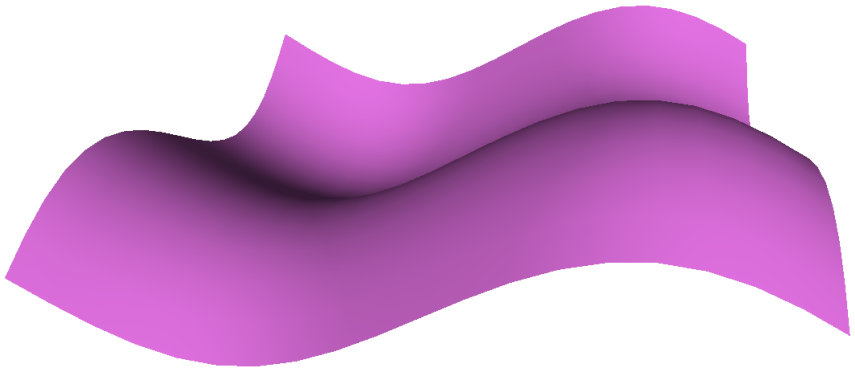
```
f = faces(pos=(
   (0,0,0),(+1,0,0),(0,+1,0),
   (0,0,0),(+1,0,0),(0,-1,0),
   (0,0,0),(-1,0,0),(0,-1,0),
   (0,0,0),(-1,0,0),(0,+1,0))
)
```



Convenient Features of Faces

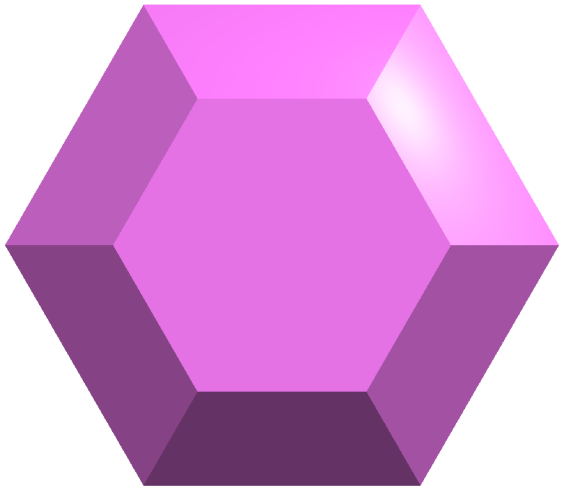
```
f.smooth()
f.make_normal()
f.make_twosided()
```





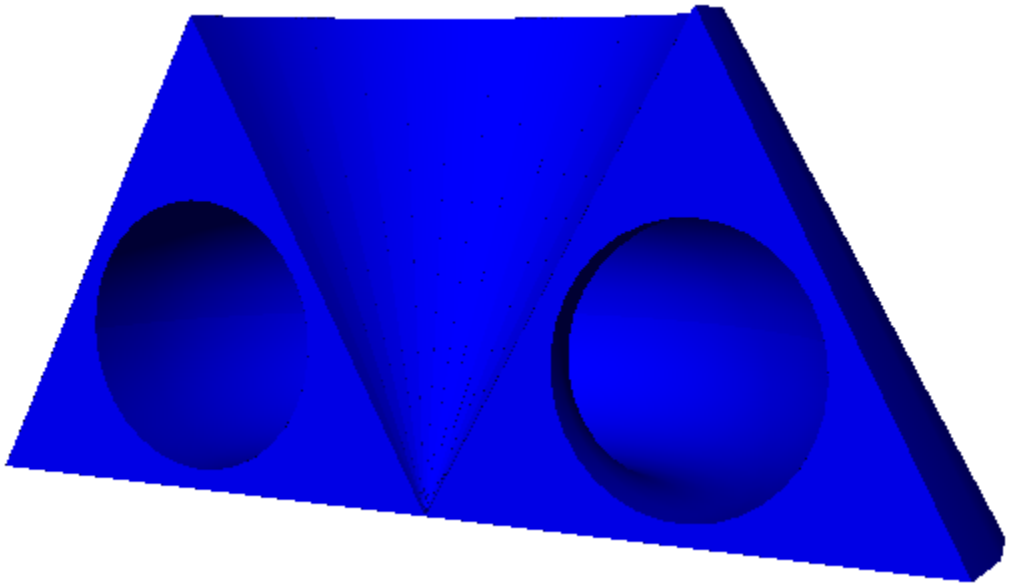
Convex and Text

```
convex(pos=[(r*cos(x),r*sin(x),1-r)
        for x in arange(-pi,pi,pi/3)
        for r in (1,2)])

text(text=u"哈囉, 沃爾德!",
      font="dft_lf3")
```



Extrusion with Paths and Shapes

```
T = shapes.triangle(pos=(0,2), length=4)
C = shapes.circle(pos=(0,2),radius=1)
P = paths.arc(radius=2)
E = extrusion(pos=P, shape=T-C)
```

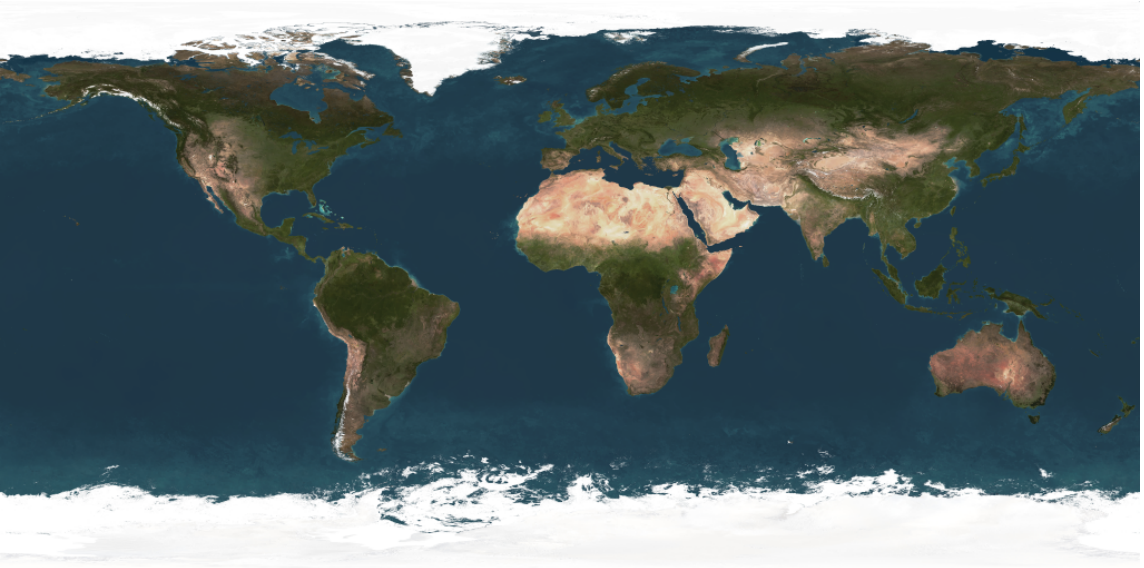


Polygon Object

demo: Electric Motor

Materials and Texture

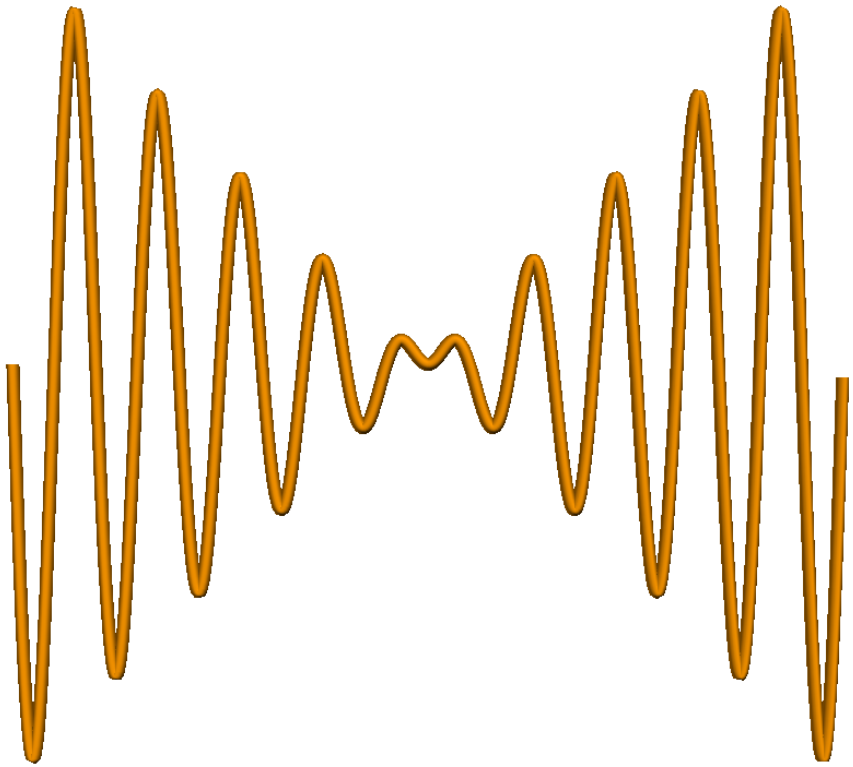
```
T = materials.texture(data=((0,1),(1,0)),
   mapping="rectangular",
   interpolate=False)
materials.saveTGA("my_pic", T)
L = materials.loadTGA("my_pic")
```



demo: Portal

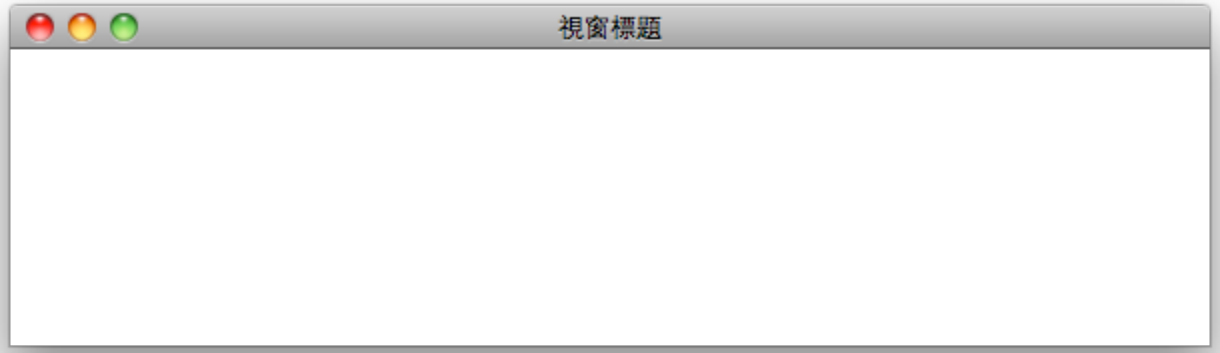
Curve

```
c = curve(pos=[ (x, x*sin(10*x))
                    for x in arange(-pi,pi,0.01) ],
              radius=0.05
)
```



Display

```
scene = display(x=0,y=30,
   width=600,height=170,
   background=(1,1,1),
   title="視窗標題",
)
```



demo: Wave