# 计算机程序设计实验报告11

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**实验要求：**

熟悉并掌握numpy库和matplotlib.pyplot

**实验题目：**

1、解方程2、手绘图3、方波绘制4、圆的绘制

**实验代码：**

1

import numpy as np

from numpy.linalg import inv

A = np.array([[1,0.5,5], [2.3,2,3], [4,1,1.7]])

b = np.array([[1,2,3]])

x = np.matmul(inv(A),np.transpose(b))

print(x)

2

#handdraw

from PIL import Image

import numpy as np

vec\_el = np.pi/2.2

vec\_az = np.pi/4.

depth = 10.

im = Image.open('basketball.jpg').convert('L')

a = np.asarray(im).astype('float')

grad = np.gradient(a)

grad\_x, grad\_y = grad

grad\_x = grad\_x\*depth/100.

grad\_y = grad\_y\*depth/100.

dx = np.cos(vec\_el)\*np.cos(vec\_az)

dy = np.cos(vec\_el)\*np.sin(vec\_az)

dz = np.sin(vec\_el)

A = np.sqrt(grad\_x\*\*2 + grad\_y\*\*2 + 1.)

uni\_x = grad\_x/A

uni\_y = grad\_y/A

uni\_z = 1./A

a2 = 255\*(dx\*uni\_x + dy\*uni\_y + dz\*uni\_z)

a2 = a2.clip(0,255)

im2 = Image.fromarray(a2.astype('uint8'))

im2.save('basketballHD.jpg')

im2.show()

3

import numpy as np

import matplotlib.pyplot as plt

t = np.linspace(0, 2\*np.pi, 2000)

N = 100

k = 1

y = np.zeros((t.shape[0],))

while k <= N:

y = y + (4\*np.sin((2\*k-1)\*t))/((2\*k-1)\*np.pi)

k = k + 1

plt.plot(t,y)

plt.show()

4

#circleDraw

import numpy as np

import matplotlib.pyplot as plt

x = np.linspace(-1,1,1000)

y = np.linspace(-1,1,1000)

px = []

py = []

for xx in x:

for yy in y:

if np.abs(xx\*\*2 + yy\*\*2 - 1) <= 1e-3:

px.append(xx)

py.append(yy)

plt.scatter(px,py)

plt.axis('equal')

plt.show()

#circleDraw

import numpy as np

import matplotlib.pyplot as plt

t = np.linspace(0,2\*np.pi,100)

x = np.sin(t)

y = np.cos(t)

plt.plot(x,y)

plt.axis('equal')

plt.show()

#circleDraw

import numpy as np

import matplotlib.pyplot as plt

x = np.linspace(-1,1,100)

y = np.sqrt(1-x\*\*2)

z = -y

plt.plot(x,y,'r')

plt.plot(x,z,'r')

plt.axis('equal')

plt.show()