作业 2

2022 年 4 月 15 日

布封实验

[65]:
```
a=2;
l=1;
cnt=0;
N=100000;
for i=1:N
    h=rand().*a./2;
    d=rand().*pi;
    if l/2.*sin(d)>=h
        cnt=cnt+1;
    end
end
cnt./N
abs(cnt/N-2.*l./pi./a)
```

```
ans =

0.3190


ans =

7.1011e-04
```

求方程 $x^3 - 3x + 1 = 0$ 的根

[38]:
```
for i=1:1000000
    x=rand()+1;
    if abs(x^3-3*x-1)<1e-4
        x
        break
    end
end
```

```
x =

1.8794
```

求 $\int_0^{\pi}\int_0^1 ycos(xy)dxdy$

[40]:
```
f = @(x, y)y .* cos(x .* y);
N = 1000000;

n = 0;
V = 1 .* pi .* pi;
fprintf("standard answer: %f\n",integral2(f,0,1,0,pi));
for i = 1:N
    x = rand();
    y = rand() .* pi;
    z = rand() .* pi;

    if f(x, y) > 0 && z <= f(x, y)
        n = n + 1;
    elseif f(x, y) < 0 && z <= -f(x, y)% 注意 elseif 是连在一起的
        n = n - 1;
    end

end

n .* V ./ N
```

```
standard answer: 2.000000
```

```
ans =

    1.9952
```

计算 $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} dxdydz$

[39]:
```
f=@(x,y,z)z;
in_bounds=@(x,y,z)y<=1-x&&z<=1-x-y;
n = 0;
V = 1 ;
N=1000000;
fprintf("standard answer:
↪%f\n",integral3(f,0,1,0,@(x)1-x,0,@(x,y)1-x-y));
for i = 1:N
    x = rand();
    y = rand();
    z = rand();
    val= rand();
    if val<=f(x,y,z)&&in_bounds(x,y,z)
        n=n+1;
    end
end

n .* V ./ N
```

```
standard answer:0.041667

ans =

    0.0414
```

鸭子问题

鸭子在圆形区域的面积为随机的，以弧度划分位置，细度设为 $\frac{1}{2\pi}$，选定 0 刻度和正方向，如果两两相邻的鸭子之间间隔存在大于 π 的则在一个半圆内

编程模拟时可通过排序使其相邻

[62]:
```
n = 0;
N = 100000;

for i = 1:N
    X = sort([rand() .* 2 .* pi, rand() .* 2 .* pi, rand() .* 2 .* pi,␣
↪rand() .* 2 .* pi]);

    if ~isempty(find(diff(X) > pi))|| X(4) - X(1) < pi
        n = n + 1;
    end

end

n ./ N
```

```
ans =

0.4994
```