SQL典例　随机数

随机数
生成方式

序号表
维护

序号表
应用实例

随机数

Any one who considers arithmetic methods of producing random digits is, of course, in a state of sin

5 + 3 + 2 = 151022

9 + 2 + 4 = 183652

8 + 6 + 3 = 482466

5 + 4 + 5 = 202541

7 + 2 + 5 = ?

生成随机数的SQL函数

```
rand( [seed] )
```

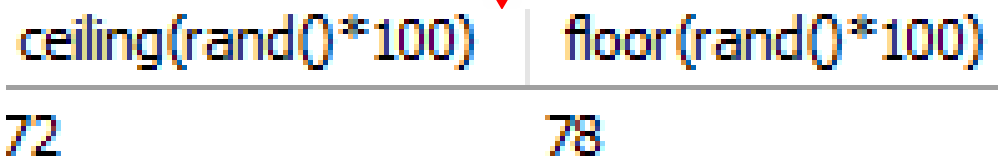
```
select    rand(), rand(), rand(10), rand(10)
```

rand()	rand()	rand(10)	rand(10)
0.26922395850459485	0.2529106347383099	0.6570515219653505	0.6570515219653505

生成一定整数范围内的随机数

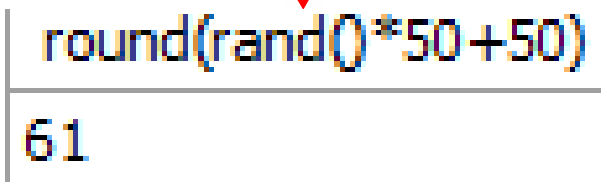
randbetween([bottom, top] **)**

```
select      ceiling(rand()*100),
            floor(rand()*100)
```



ceiling(rand()*100)	floor(rand()*100)
72	78

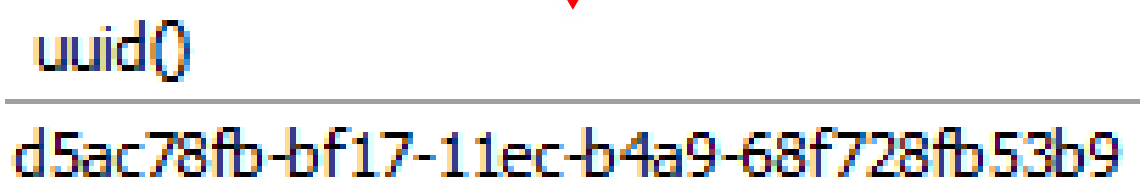
```
select      round(rand()*50+50)
```



round(rand()*50+50)
61

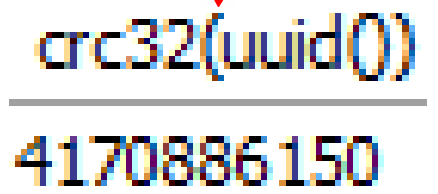
随机数DIY

```
select      uuid()
```



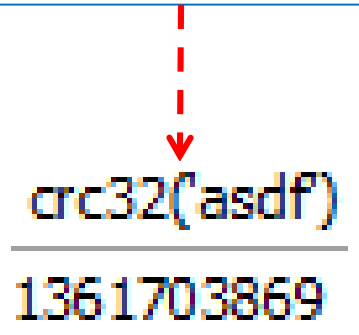
uuid()
d5ac78fb-bf17-11ec-b4a9-68f728fb53b9

```
select      crc32( uuid () )
```



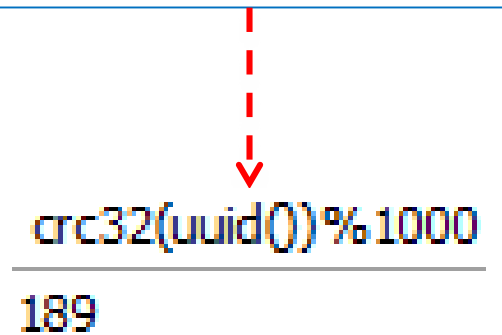
crc32(uuid())
4170886150

```
select      crc32( 'asdf' )
```



crc32('asdf')
1361703869

```
select      crc32( uuid () ) % 1000
```



crc32(uuid())%1000
189

随机返回表中若干行

```
select    *
from      seqNums
order by  rand()
limit  5;
```

sn
569
421
391
444
951

生成指定数目的随机数

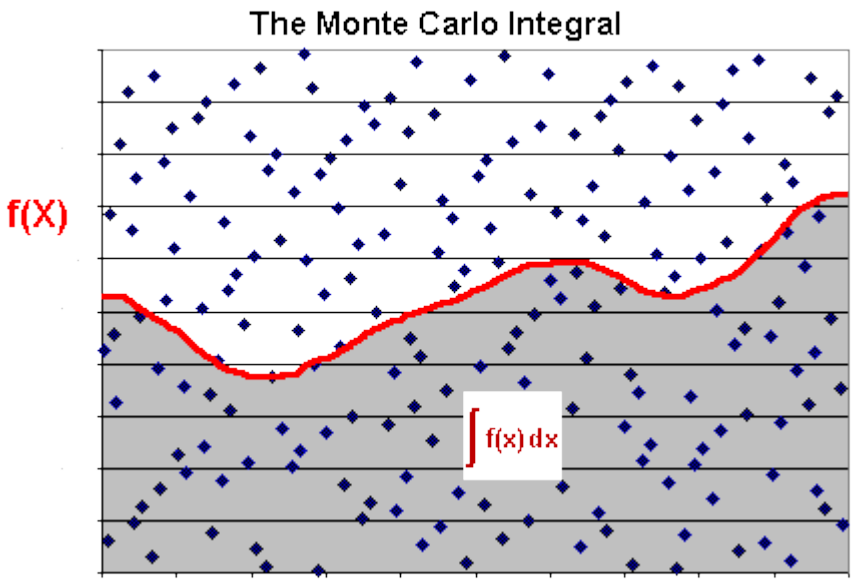
```
select    ceiling(rand()*100)
from      seqNums
where     sn <= 5
```

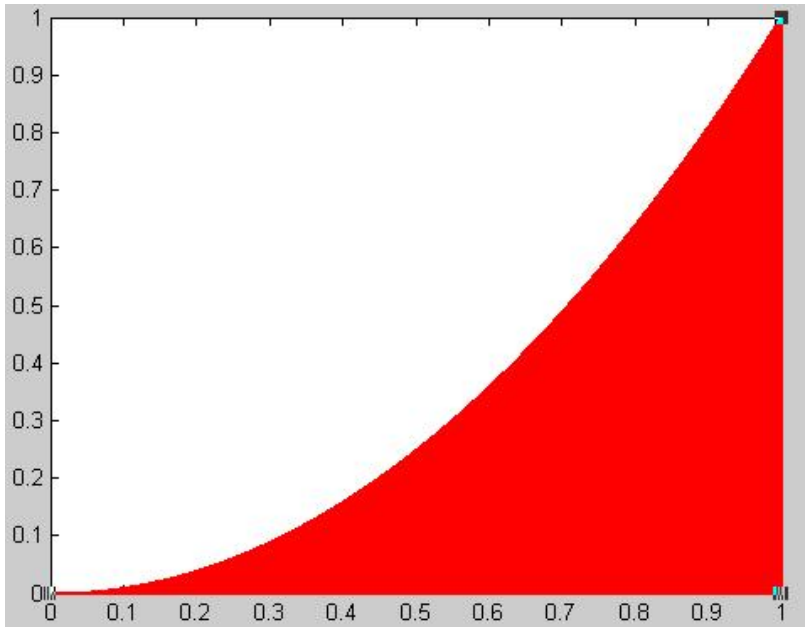
ceiling(rand()*100)
35
13
61
65
41

按采样率返回表中行

```
select  *  from  seqNums
where  rand() <= 0.1
```

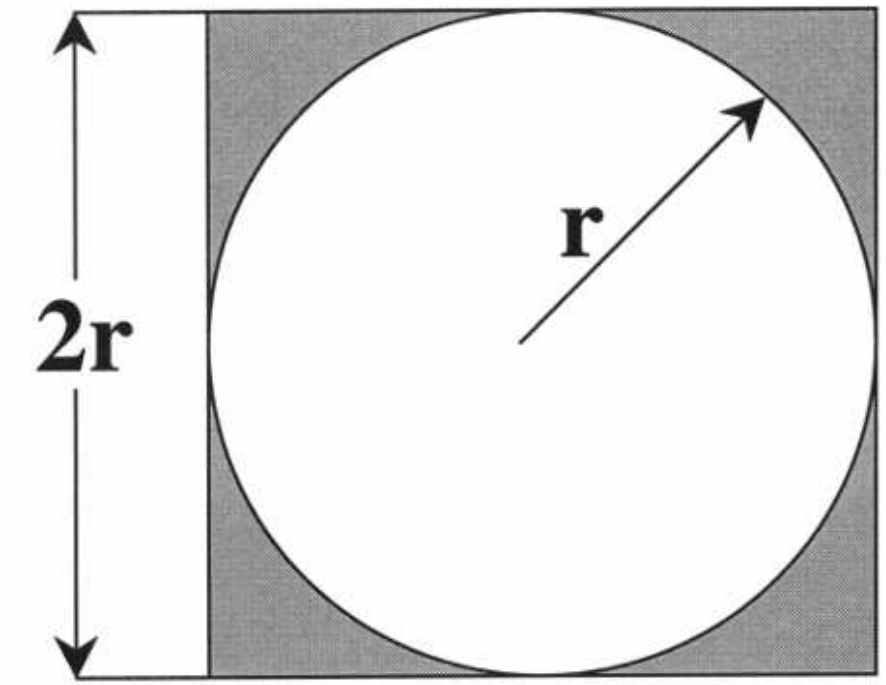
蒙特卡罗模拟：积分

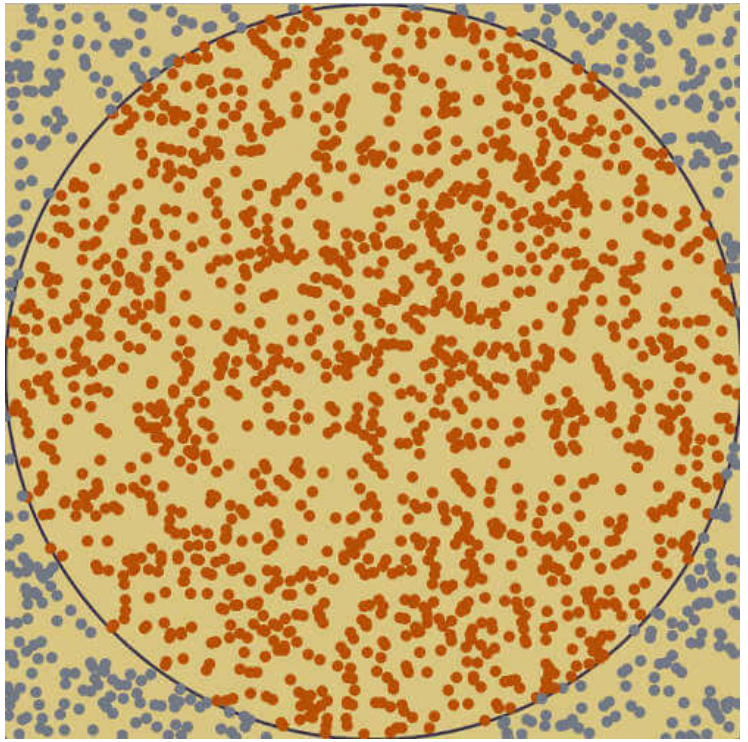

The Monte Carlo Integral
f(X)
∫ f(x) dx


1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

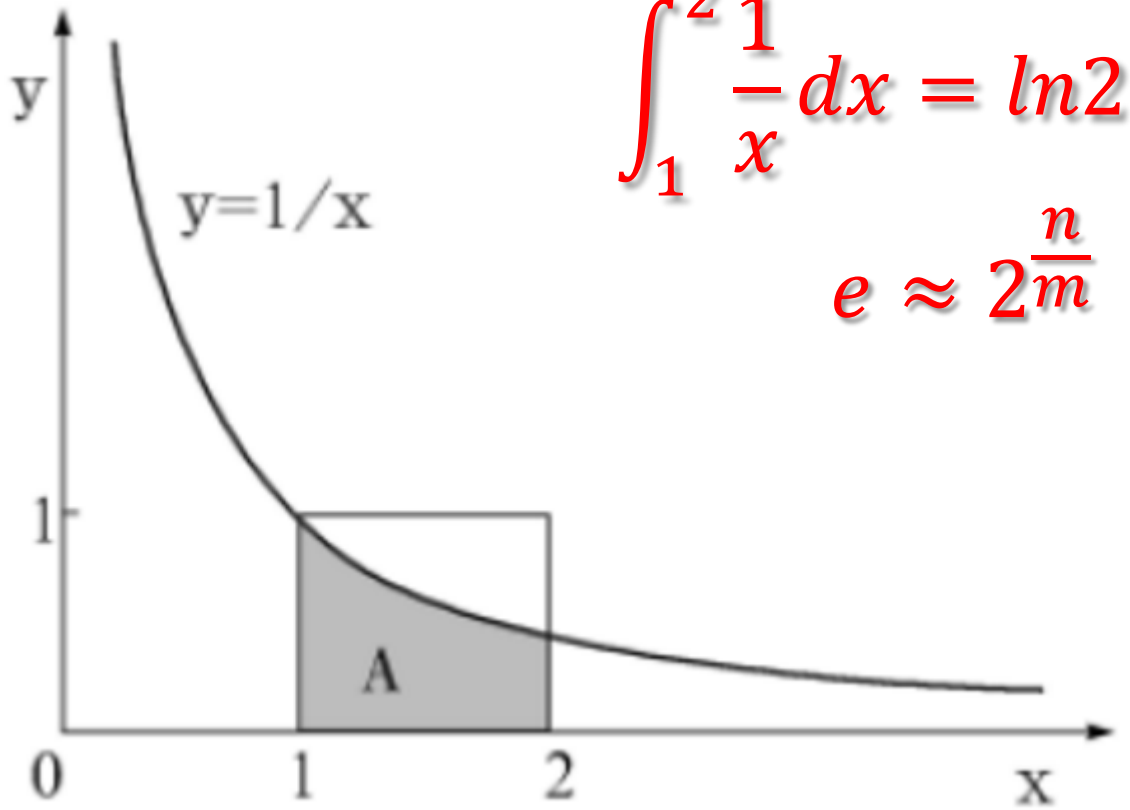
蒙特卡罗模拟：求π

$$\frac{Area\ of\ Circle}{Area\ of\ Square} = \frac{\pi r^2}{(2r)^2} = \frac{\pi}{4}$$





蒙特卡罗模拟：求e



$$\int_1^2 \frac{1}{x} dx = ln2 \approx \frac{m}{n}$$

$$e \approx 2^{\frac{n}{m}}$$

蒙特卡罗模拟：验证三门问题概率

```
with  T0  as (
  select      1 + crc32( uuid ( ) ) % 3  as  prize_door
  from        seqNums
  where       sn <= 100000 ) ,
```

随机生成中奖门，
编号为1，2，3之一

```
T1  as (
  select      prize_door, 1 + crc32( uuid ( ) ) % 3  as  your_door
  from        T0 ) ,
```

随机生成选择门，
编号为1，2，3之一

蒙特卡罗模拟：验证三门问题概率

```
T2  as (

 select        prize_door,  your_door,

       case    when   prize_door  < >  your_door  then  6 - prize_door - your_door

               else  substring(  replace( '123', right( your_door, 1 ), '' ),

                                    1 + crc32( uuid ( ) ) % 2,  1)

       end  as  open_door

 from          T1 ) ,
```

若 prize_door=1, your_door=2

则 open_door=6-1-2=3

若 prize_door=your_door=2

则 open_door等概率选择1, 3之一

蒙特卡罗模拟：验证三门问题概率

```
T3  as (
  select      prize_door,    your_door,    open_door,
              6 - your_door - open_door  as  remanent_door
  from        T2 ) ,
```

蒙特卡罗模拟：验证三门问题概率

```
T4  as (
  select
      count( case when  prize_door = your_door  then  'Stay'  end )  as  staying_wins,
      count( case when  prize_door = other_door  then  'Switch'  end )  as  switching_wins,
      count(*)  as  trials
  from        T3 )
```

蒙特卡罗模拟：验证三门问题概率

```
select
        trials,
        cast( 100.0 * staying_wins / trials  as  decimal(5, 2) )  as  staying_winsPercent,
        cast( 100.0 * switching_wins / trials  as  decimal(5, 2))  as  switching_winsPercent
from          T4
```

trials	staying_winsPercent	switching_winsPercent
10000	32.96	67.04

最优停止问题

- 典型的是选秘书问题。在招聘秘书时，你的选择是要么接受当前的面试者，要么回绝她，继续面试下一位。一种策略是回绝前r个人，然后考察后面的面试者，如果其素质超过前面的人就接受她。问题是如何确定r使得招到最好秘书的概率最大。
- 结论是r = N/e，招到最好秘书的概率是37%。

潘尼游戏

- 连续抛一枚硬币三次，所出现的组合有8种，正正正，正正反...反反反
- 潘尼游戏是一方先任选一种组合，然后另一方再从剩余的组合中选择一种。然后开始抛硬币，谁选定的组合先出现谁就获胜
- 后选一方可以根据先选一方的组合来决定自己的所要选择的组合。诀窍是：后手方选择的组合的后两项是先手组合的前两项，而第一项与最后一项相反。比如先手组合是“正正反”，则后手选择组合“反正正”；先手组合是“正反正”，则后手选择组合“正正反”
- 请统计后手组合对先手组合获胜的概率