



## 实验28 概率论中生日问题的模拟

此程序可模拟任意 $m$ 个人中至少有两个人生日一样的概率:

```

birth(n, m) :=
  s ← 0
  for i ∈ 0..n
    for j ∈ 0..m
      xj ← ceil(rnd(1)·365)
      u ← 0
      for k ∈ 0..m - 1
        for l ∈ k + 1..m
          if xl = xk
            z ← 1
            u ← u + z
          continue otherwise
      s ← s + 1 if u ≠ 0
   $\frac{s}{n + 1}$ 

```

$\text{birth}(100, 40) = 0.87128713$

以下程序用来确定任意 $m$ 个人中生日一样的人数对:输出结果中的最后一个数据统计出这个人数对的值.

```

fre(m) :=
  for j ∈ 0..m
    xj ← ceil(rnd(1)·365)
  u ← 0
  for k ∈ 0..m - 1
    for l ∈ k + 1..m
      if xl = xk
        z ← 1
        u ← u + z
      continue otherwise
  x ← sort(x)
  xm+1 ← u
  xT

```

fre(50) =

	0	1	2	3	4	5	6	7	8	9	10	11
0	15	20	37	44	50	54	58	68	75	77	84	87

按照通常的计算有:

$$p_{birth}(k) := 1 - \prod_{i=1}^k \frac{(365 - i + 1)}{365} \quad n := 20,40..120 \quad m := 30,50..130$$

n =	p <sub>birth</sub> (n) =	m =	p <sub>birth</sub> (m) =
20	0.4114383836	30	0.706316242719
40	0.8912318098	50	0.970373579578
60	0.9941226609	70	0.999159575965
80	0.9999143319	90	0.999993848356
100	0.9999996928	110	0.999999989471
120	0.9999999998	130	0.999999999996