```
    |\^/|     Maple 9 (IBM INTEL LINUX)
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 \  MAPLE  /  All rights reserved. Maple is a trademark of
 <____ ____>  Waterloo Maple Inc.
      |       Type ? for help.
>  interface(screenwidth=120);
>  2^1000000000000 mod 7; # la puissance est faite dans Z
Error, numeric exception: overflow
>  2&^1000000000000 mod 7;# c'est mod qui calcule la puissance.
                                                        2

>  [1,3,1],nops([1,3,1]); # est une suite ou liste
                                                   [1, 3, 1], 3

>  {1,3,1},nops({1,3,1}); # est un ensemble, il est donc egal {\'a} {1,3}
                                                    {1, 3}, 2

> l:=[];# voici la liste vide;
                                                     l := []

> l:=[op(l),1]:l:=[op(l),3]:l:=[op(l),1]:l;
                                                    [1, 3, 1]

>  #Si a=1, on a x_n=x_0+n.c [m], on fait donc par exemple: c=7,x0=1
> with(stats):with(statplots):
> l:=[seq(n.7+1 mod 1001,n=1..100)]:
> histogram(l,area=count,numbars=20);
```
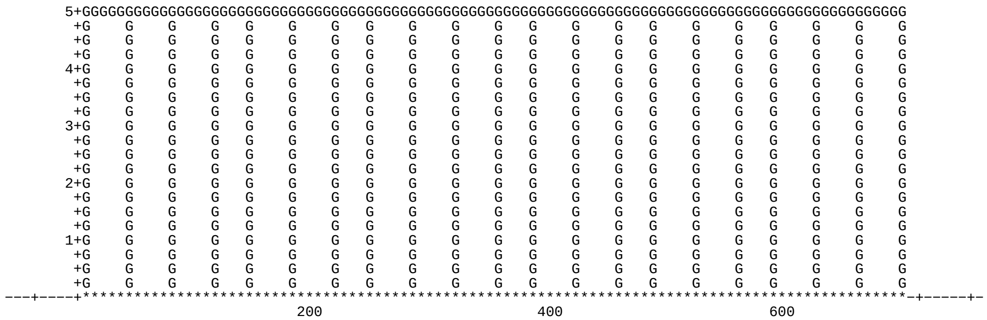
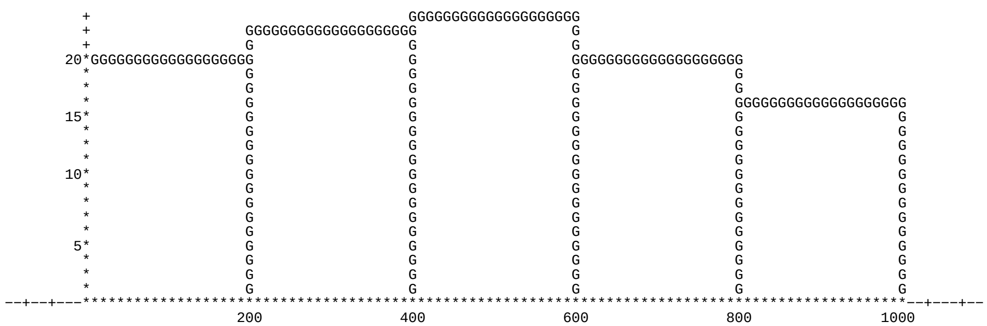
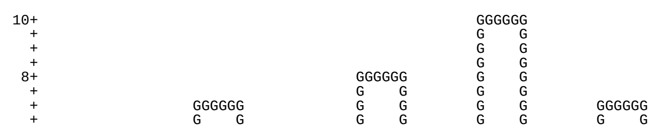
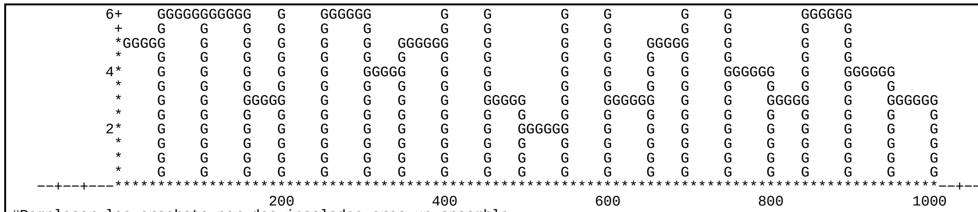



```
#C'est tout a fait plat. Trop.
> nops(l);nops({op(l)}); #ils sont tous distincts
                                                        100

                                                        100

>  r:=rand(0..1000);
r := proc()
local t;
global _seed;
    _seed := irem(a*_seed, p);
    t := _seed;
    to concats do _seed := irem(a*_seed, p); t := s*t + _seed end do;
    irem(t, divisor) + offset
end proc

>  l:=[seq(r(n),n=1..100)]:
>  histogram(l,area=count,numbars=5);
```

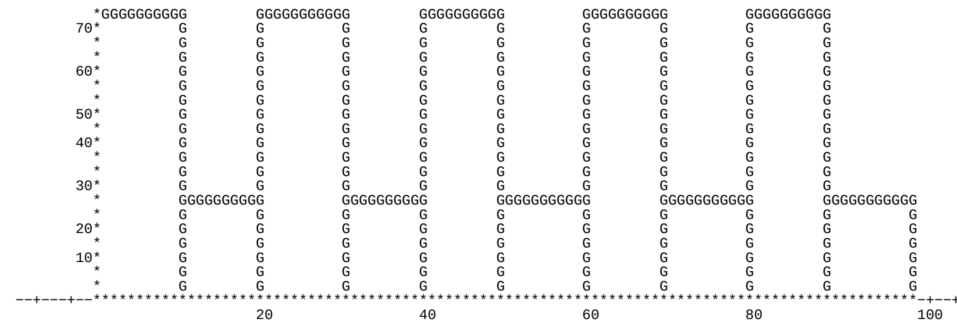


```
>  histogram(l,area=count,numbars=20);
```





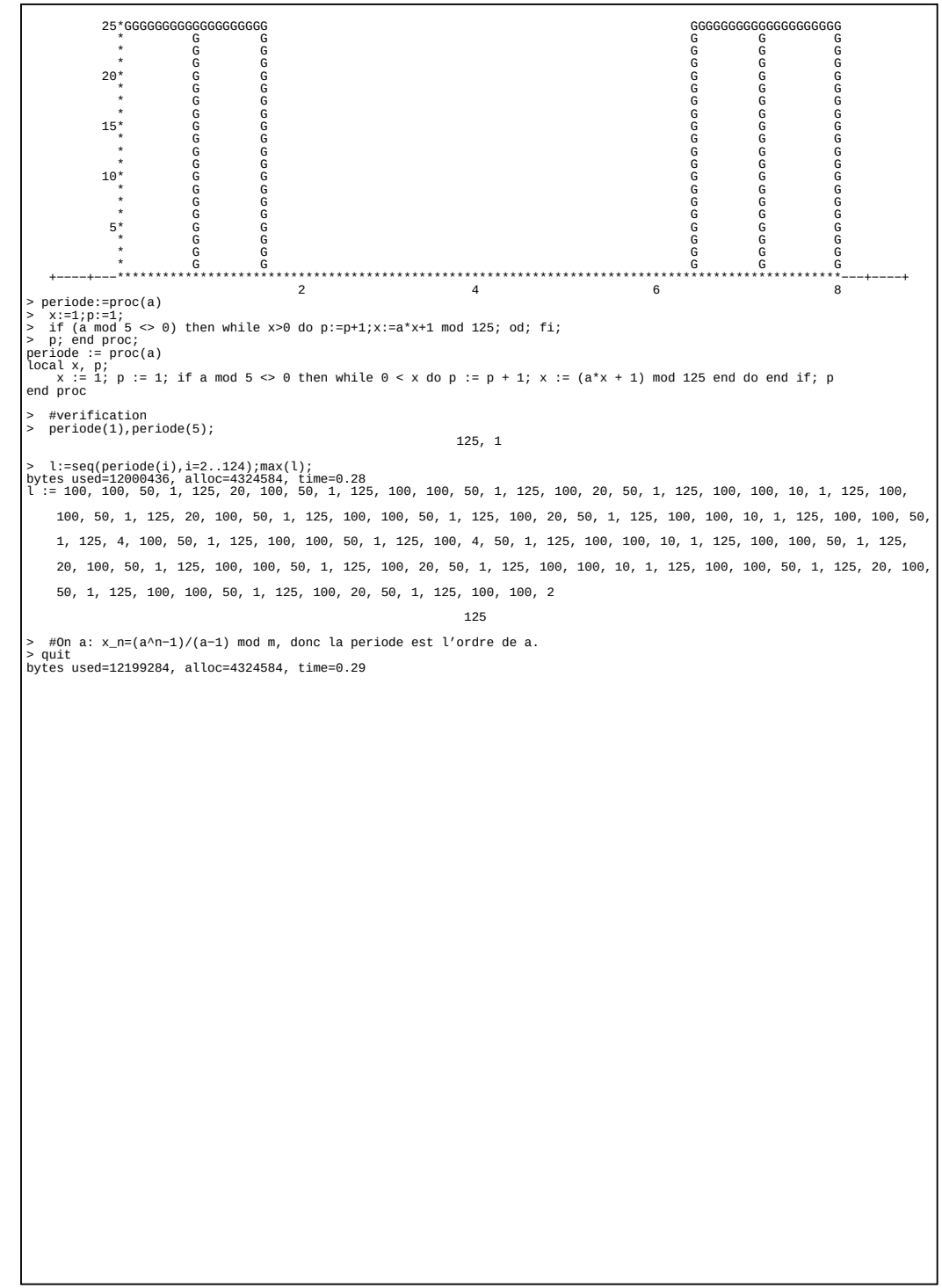
```
#Remplacer les crochets par des incolades cree un ensemble.
>  nops(l);nops({op(l)});#il y a bien des anniversaires identiques
                                                  100

                                                  98

>  #On a en fait 1000^100 suites possibles, et 1000!/900! suites dont
>  #tous les termes sont distincts.
>  1000!/900!/1000.^100;
                                             0.005958926632

> x:=1; a:=237;c:=54321;m:=10^4; l:=[];
                                                  x := 1

                                                 a := 237

                                                c := 54321

                                                m := 10000

                                                  l := []

> for i from 1 to 500  do x:=a*x+c mod m; l:=[op(l),x] ; od:
> l1:=[seq(i mod 10^2,i=l)]:
> l2:=[seq(trunc(i/10^2),i=l)]:
> histogram(l1,area=count,numbars=10);
bytes used=4000060, alloc=3472772, time=0.09
```



```
> histogram(l2,area=count,numbars=10);
```

```
> l1:=[seq(i mod 10,i=l)]:
> histogram(l1,area=count,numbars=10);
```

```
          60*         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
          40*         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
          20*         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
            *         G        G                                                  G        G         G
   +----+---*****************************************************************************************---+----+
                                 2                   4                   6                   8
#Si d est un diviseur de m et que $y_n=x_n [d]$, alors $y_{n+1}=ay_n+c [d]$
#Donc si d=10^2, les 2 derniers chiffres de x_n ont p{\'e}riode d'au plus d.
>  x:=1; a:=237;c:=54321;m:=10^4-1; l:=[];
                                                        x := 1

                                                       a := 237

                                                      c := 54321

                                                      m := 9999

                                                       l := []

>  for i from 1 to 500  do x:=a*x+c mod m; l:=[op(l),x] ; od:
>  l1:=[seq(i mod 10^2,i=l)]:
>  l2:=[seq(trunc(i/10^2),i=l)]:
>  histogram(l1,area=count,numbars=10);

       70+  GGGGGGGGGGG                                      GGGGGGGGGG                  GGGGGGGGGGG
         +  G         G                                      G        G                  G         G
         +  G         G                                      G        G                  G         G
       60+  G         G                                      G        G                  G         G
         +  G         G                                      G        G         GGGGGGGGGG         G
         +  G         G                                      G        G         G        G         G
       50+  G         G                                      G        GGGGGGGGGG        G         G
         +  G         G                             GGGGGGGGGG        G         G        G         G
         +  G         G        GGGGGGGGGG           G        G         G         G        G         G
       40+  G         GGGGGGGGGG         GGGGGGGGGG  G        G         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
       30+  G         G        G         G        G        G         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
       20+  G         G        G         G        GGGGGGGGGG         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
       10+  G         G        G         G        G        G         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
         +  G         G        G         G        G        G         G         G        G         G
   ---+---+--*****************************************************************************************+--+--+-
                          20                  40                  60                  80                  100
>  histogram(l2,area=count,numbars=10);

            +         GGGGGGGGGG
          70+         G        G                  GGGGGGGGGG
            +         G        G                  G        G
            +         G        G                  G        G
          60+         G        G                  G        G
            +         G        G         GGGGGGGGGG        GGGGGGGGGG
          50+         G        GGGGGGGGGG         G        G         GGGGGGGGGG
            +         G        G         G        G        G         G
            +         G        G         G        G        G         G
          40*GGGGGGGGGG        G         G        G        G         G
            *         G        G         G        G        G         G
            *         G        G         G        G        G         G
          30*         G        G         G        G        G         G        GGGGGGGGGGGGGGGGGGG
            *         G        G         G        G        G         G        G         G
            *         G        G         G        G        G         G        G         G
          20*         G        G         G        G        G         G        G         G
            *         G        G         G        G        G         G        G         G
            *         G        G         G        G        G         G        G         G
          10*         G        G         G        G        G         G        G         G
            *         G        G         G        G        G         G        G         G
            *         G        G         G        G        G         G        G         G
   --+---+--*****************************************************************************************+--+---+-
                          20                  40                  60                  80                  100
>  l1:=[seq(i mod 10,i=l)]:
>  histogram(l1,area=count,numbars=10);
bytes used=8000284, alloc=4259060, time=0.18

          80+                                                                         GGGGGGGGGGG
            +                                                                         G         G
            +                                                         GGGGGGGGGGG     G         G
            +                                                         G         G     G         G
            +                                                         G         G     G         G
          60+         GGGGGGGGGGGGGGGGGGG                             G         G     G         G
            +         G        G         G                  GGGGGGGGGG         GGGGGGGGGG         G
            +         G        G         G                  G        G         G         G        G
            +         G        G         G                  G        G         G         G        G
            +         G        G         G                  G        G         G         G        G
          40+         G        G         G                  G        G         G         G        G
            +         G        G         GGGGGGGGGG         G        G         G         G        G
            +         G        G         G        G         G        G         G         G        G
            *GGGGGGGGGG        G         G        GGGGGGGGGG G        G         G         G        G
            *         G        G         G        G         GGGGGGGGGG G        G         G        G
          20*         G        G         G        G         G        G         G         G        G
            *         G        G         G        G         G        G         G         G        G
            *         G        G         G        G         G        G         G         G        G
            *         G        G         G        G         G        G         G         G        G
            *         G        G         G        G         G        G         G         G        G
   -+---+---*****************************************************************************************-+---+---
                                 2                   4                   6                   8
>  x:=1; a:=237;c:=54321;m:=prevprime(10^4); l:=[];
                                                        x := 1

                                                       a := 237

                                                      c := 54321

                                                      m := 9973

                                                       l := []

>  for i from 1 to 500  do x:=a*x+c mod m; l:=[op(l),x] ; od:
>  l1:=[seq(i mod 10^2,i=l)]:
>  l2:=[seq(trunc(i/10^2),i=l)]:
>  histogram(l1,area=count,numbars=10);

            +                                                                         GGGGGGGGGG
          60+                 GGGGGGGGGGG                                             G         G
            +                 G         G                                             G         G
            +         GGGGGGGGGG         G        GGGGGGGGGG                           G         G
          50+         G        G         G        G        G         GGGGGGGGGG         G         G
            +         G        G         G        G        GGGGGGGGGG        G         GGGGGGGGGG         G
            +         G        G         G        G        G         GGGGGGGGGG         G         G        G
          40*GGGGGGGGGG        G         GGGGGGGGGG G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
          30*         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
          20*         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
          10*         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
            *         G        G         G        G        G         G        G         G         G        G
   --+---+--*****************************************************************************************+--+---+-
                          20                  40                  60                  80                  100
>  histogram(l,area=count,numbars=10);#certaines valeurs ne sont pas atteintes.
```




```
> periode:=proc(a)
>  x:=1;p:=1;
>  if (a mod 5 <> 0) then while x>0 do p:=p+1;x:=a*x+1 mod 125; od; fi;
>  p; end proc;
periode := proc(a)
local x, p;
    x := 1; p := 1; if a mod 5 <> 0 then while 0 < x do p := p + 1; x := (a*x + 1) mod 125 end do end if; p
end proc

>  #verification
>  periode(1),periode(5);
                                                    125, 1

>  l:=seq(periode(i),i=2..124);max(l);
bytes used=12000436, alloc=4324584, time=0.28
l := 100, 100, 50, 1, 125, 20, 100, 50, 1, 125, 100, 100, 50, 1, 125, 100, 20, 50, 1, 125, 100, 100, 10, 1, 125, 100,

    100, 50, 1, 125, 20, 100, 50, 1, 125, 100, 100, 50, 1, 125, 100, 20, 50, 1, 125, 100, 100, 10, 1, 125, 100, 100, 50,

    1, 125, 4, 100, 50, 1, 125, 100, 100, 50, 1, 125, 100, 4, 50, 1, 125, 100, 100, 10, 1, 125, 100, 100, 50, 1, 125,

    20, 100, 50, 1, 125, 100, 100, 50, 1, 125, 100, 20, 50, 1, 125, 100, 100, 10, 1, 125, 100, 100, 50, 1, 125, 20, 100,

    50, 1, 125, 100, 100, 50, 1, 125, 100, 20, 50, 1, 125, 100, 100, 2

                                                     125

>  #On a: x_n=(a^n-1)/(a-1) mod m, donc la periode est l'ordre de a.
> quit
bytes used=12199284, alloc=4324584, time=0.29
```