

```
> restart; with(numtheory);
[Glgcd, bigomega, cfrac, cfracpol, cyclotomic, divisors, factorEQ, factorset, fermat, imagunit,
index, integral_basis, invcfrac, invphi, iscyclotomic, issqrfree, jacobi, kronecker, λ,
legendre, mcombine, mersenne, migcdex, minkowski, mipolys, mlog, mobius, mroot, msqrt,
nearestp, nthconver, nthdenom, nthnumer, nthpow, order, pdexpand, φ, π, pprimroot,
primroot, quadres, rootsunity, safeprime, σ, sq2factor, sum2sqr, τ, thue]
```

```
> M := 2^n-1 : seq(M, n=[2, 3, 5, 7, 11, 13, 17]);
3, 7, 31, 127, 2047, 8191, 131071
```

```
> lucas := proc(n)
local M, L, k;
M := 2^n-1; L := 4;
for k from 2 to n-1 do L := (L^2 - 2) mod M; od;
evalb(L=0);
end;
```

```
lucas := proc(n)
local M, L, k;
M:=2^n - 1;
L:=4;
for k from 2 to n - 1 do L:=mod(L^2 - 2, M) end do;
evalb(L=0)
end proc
```

```
> n := 2281 : length(M); debut := time() : lucas(n); time() - debut;
687
true
0.079
```

```
> n := 15281 : length(M); debut := time() : lucas(n); time() - debut;
4601
false
9.140
```

```
> sigma(6);
12
```

```
> lucas := proc(n)
local M, L, k, i;
for i to n do
M := 2^(prim[i]) - 1; L := 4;
```

```

for k from 2 to prim[i] - 1 do L := (L2 - 2) mod M; od;
print(prim[i]); print(M, length(M));
print(evalb(L=0)); print( ) :
od;
end;

```

```

lucas := proc(n)

```

(7)

```

local M, L, k, i;

```

```

for i to n do

```

```

    M := 2prim[i] - 1;

```

```

    L := 4;

```

```

    for k from 2 to prim[i] - 1 do L := mod(L2 - 2, M) end do;

```

```

    print(prim[i]);

```

```

    print(M, length(M));

```

```

    print(evalb(L=0));

```

```

    print( )

```

```

end do

```

```

end proc

```

```

prim := [3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97,
101, 103, 107, 109, 113, 2203, 4253]

```

(8)

```

> nops(prim);

```

31

(9)

```

> lucas(13) :

```

3

7, 1

*true*

5

31, 2

*true*

7

127, 3

*true*

11

2047, 4

*false*

13

8191, 4

*true*

17

131071, 6

*true*

19

524287, 6

*true*

23

8388607, 7

*false*

29

536870911, 9

*false*

31

2147483647, 10

*true*

37

137438953471, 12

*false*

41

2199023255551, 13

*false*

43

8796093022207, 13

*false*

(10)

```
> sigma(230.2147483647) - 230.2147483647;  
2305843008139952128
```

(11)

```
> 230.2147483647;
```



2305843008139952128

(12)