Contributions to Online Encyclopedia of Integer Sequences
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The Contributions of Matt C. Anderson
before 2025

Contributions, so far, fall into two categories.

Prime Constellations (which are special k-tuples),

and Euler's positive lucky trinomial.

This special trinomial has

the form $n^2 + n + p$.
Let $f(n) = n^2 + n + p$.
where p is in the set {2, 3, 5, 11, 17, 41}.
also, n is strictly a positive, natural number, that is, a counting number.
this exploration is restricted to the cases, for p at 17 and 41.
Notice similarities in the graphs of discrete divisors
also, when p is 41, the smallest n that makes f(n) composite is 40.
We prove this by exhaustive search of all positive integers 1 to 39, and find that f(n), for these cases, is a prime number.
Also, this f(n) can be partially factored, in the form,
$f(n) = n*(n+1) + 41$.
and then $f(40) = 40*41 + 41 = 41^2$,
which is a composite number.
Thus we have an informal proof of this property of f(n).

# THE ON-LINE ENCYCLOPEDIA OF INTEGER SEQUENCES ®

founded in 1964 by N. J. A. Sloane

matt c anderson | Search | Hints

(Greetings from The On-Line Encyclopedia of Integer Sequences!)

Search: **matt c anderson**

Displaying 1-10 of 52 results found. page 1 2 3 4 5 6

Sort: relevance | references | number | modified | created Format: long | short | data

**A201998** Positive numbers n such that n^2 + n + 41 is composite and there are no positive that n = **c***x^2 + (**c** + 1)*x + **c***41 for an integer x.

244, 249, 251, 266, 270, 295, 301, 336, 344, 389, 399, 407, 416, 418, 445, 449, 454, 466, 489, 494, 496, 500, 506, 527, 531, 545, 547, 563, 570, 571, 5

620, 622, 624, 628, 630, 636, 652, 661, 662, 663, 679, 693, 699 (list; graph; refs; listen; history; edit; text; internal format)

OFFSET 1,1

COMMENTS The composition of functions k(x) factors. k(x) = (x^2 + x + 41)*(**c**^2*x^2 + (**c**^2 + 2*c)*x + **c**^2*41 + **c** + 1). So k(x) is the p greater than one and thus composite.

REFERENCES John Stillwell, Elements of Number Theory, Springer, 2003, page 3.

AUTHOR _**Matt C. Anderson**_, Dec 07 2011

STATUS approved

**A235381** Positive numbers n such that n^2 + n + 41 is composite and there are no positive such that n = **c***d*x^2 + ((d-2)*c + 1)*x + ((41*d^2 - d + 1)*c -1)/d for an intege

611, 622, 630, 663, 679, 734, 758, 835, 867, 966, 978, 995, 1006, 1009, 1060, 1088, 1127, 1142, 1157, 1173, 1175, 1183, 1228, 1280, 1345, 1355, 1368, 1

1455, 1457, 1467, 1497, 1538, 1539, 1543, 1554, 1578, 1603, 1612, 1613, 1630, 1661 (list; graph; refs; listen; history; edit; text; internal

OFFSET 1,1

COMMENTS Restricting **c** and d so that **c** is congruent to 1 modulo d, we have that the composition of functions k(x) factors. k(x) = (1/d' x^2*d^2 - d - 2*x*d + 41*d^2)*(**c**^2*d^2*x^2 + x*d^2*c^2 + 41*c^2*d^2 + 2*x*d*c^2 - 2*x*d*c^2 + c*d - c^2*d + 1). So k(x) is integers greater than one and is thus composite.

REFERENCES John Stillwell, Elements of Number Theory, Springer 2003, page 3.

LINKS **Matt C. Anderson**, Table of n, a(n) for n = 1..75

EXAMPLE If d = 1 then n = **c***n^2 + (1 - **c**)*x + 41*c - 1. This is, up to a change of variables, equivalent to A201998.

MAPLE

```
maxn := 1000;
A := {};
for n to maxn do
g := n^2+n+41;
if isprime(g) = false then
A := `union`(A, {n}) :
end if :
end do :
A:
# the A list now contains Positive numbers n such that
# n^2 + n + 41 is composite.
# an upper limit for the number of iterations in the
# triple nested while loops is 1000^3 or a billion.
c:=1:
d:=1:
```

```
x:=-1:
p:=41:
q:=c*d*x^2+((d-2)*c+1)*x+((p*d^2-d+1)*c-1)/d;
A2:=A:
while q < maxn do
while q < maxn do
while q < maxn do
  A2:=A2 minus {q}:
  A2:=A2 minus {c*x^(2)+(c+1)*x+c*p}:
  A2:=A2 minus {c*d*x^2-((d-2)*c+1)*x+((p*d^2-d+1)*c-1)/d}:
  x:=x+1:
  q:=c*d*x^2+((d-2)*c+1)*x+((p*d^2-d+1)*c-1)/d:
end do:
c:=c+1:
x:=-1:
q:=c*d*x^2+((d-2)*c+1)*x+((p*d^2-d+1)*c-1)/d:
end do:
d:=d+1:
c:=1:
x:=-1:
q:=c*d*x^2+((d-2)*c+1)*x+((p*d^2-d+1)*c-1)/d:
end do:
A2
```

CROSSREFS Cf. A007634 (numbers n such that n^2 + n + 41 is composite).
Cf. A201998 and A241529 (similar subsequences of A007634).

KEYWORD nonn

AUTHOR **_Matt C. Anderson_**, Jan 08 2014

EXTENSIONS Corrected and edited by **_Matt C. Anderson_**, Jan 23 2014

STATUS approved

## A241529 Positive numbers k such that k^2 + k + 41 is composite and there are no positive integers a,**c**,d such that k = **c***a*z^2 + ((((d+2)*(1/3))***c**-2)*a/d+1)*z + ((((367*d^2+d+1)*(1/9))***c**^2-((d+2)*(1/3))***c**+1)*a/d^2 - (((d-1)*(1/3))***c**+1)/d)/**c** for an integer z.

2887, 2969, 3056, 3220, 3365, 3464, 3565, 3611, 3719, 3746, 3814, 3836, 3874, 3879, 3955, 4142, 4147, 4211, 4277, 4371, 4403, 4483, 4564, 4572, 4661, 4730, 4813, 4881, 4888, 4902, 4906, 4965, 4982, 5132, 5175, 5208, 5410, 5431, 5509, 5527, 5564, 5624, 5669 (list; graph; refs; listen; history; edit; text; internal format)

OFFSET 1,1

COMMENTS This sequence has a restriction involving 4 variables. More composite cases are described with a better restrictive expression. The expression for k(a,**c**,d,z) will force k^2 + k + 41 to be either a fraction or a composite number.
The condition on k(a,**c**,d,z) was determined by quadratic curve fitting. It has been automated with the Maple Interactive() command. The ultimate motivation is to try to find a closed-from expression that generates all the composite cases of k^2 + k + 41 for integer k.
What is the smallest value of n where this sequence's a(n) < 2n? (For A194634, this value is 2358.) - J. Lowell, Feb 25 2019

CROSSREFS Cf. A007634, A055390, A201998, and with division, A235381.

KEYWORD nonn

AUTHOR **_Matt C. Anderson_**, Apr 27 2014

STATUS approved

## A248015 Positive numbers n such that n^2 + 1 is composite and there are no positive integers **c** and z such that n = **c***z^2 + z + **c**.

8, 18, 28, 30, 34, 44, 46, 48, 50, 58, 60, 64, 68, 70, 76, 78, 86, 88, 96, 98, 100, 104, 108, 114, 118, 128, 136, 144, 148, 158, 164, 166, 168, 178, 186, 188, 190, 194, 196, 198, 200 (list; graph; refs; listen; history; edit; text; internal format)

OFFSET 1,1

COMMENTS Subset of A134407.
If f(x) = x^2 + 1 and g(**c**,y) = **c***y^2 + y + **c** then the algebraic substitution of g for x gives a factorization: f(g(**c**,y)) = (y^2 + 1)*(**c**^2*y^2 + **c**^2 + 2***c***y + 1). Since both factors of f(g(**c**,y)) are integers greater than one, f(g(**c**,y)) is a composite number.
The numbers are necessarily even terms from A134407 since for odd n = 2c + 1 one has the "forbidden" decomposition with z = 1. - M. F. Hasler, Oct 04 2014

LINKS Table of n, a(n) for n=1..41.
Eric Weisstein's World of Mathematics, Landau's Problems

MAPLE
```
maxn:=200:
mb:=proc(n::integer)::integer;
  if isprime(n^2+1)=false then return n else return -1 fi;
end proc:
A134407 := Vector(maxn):
for a from 1 to maxn do A134407[a]:= mb(a): end do:
A134407s:=convert(A134407, 'set') minus {-1}:
A134407l:=convert(A134407s, 'list'):
for c from 1 to 200 do
  for z from 1 to 20 do
    A134407s := A134407s minus {c*z^2 + z + c}:
  end do:
end do:
A134407s;
```

PROG (PARI) is(n)={!bittest(n, 0)&&!isprime(n^2+1)&&!for(z=2, sqrtint(n), (n-z)%(z^2+1)||return)} \\ M. F. Hasler, Oct 04 2014

CROSSREFS Cf. A134407.

KEYWORD nonn

AUTHOR **_Matt C. Anderson_**, Sep 29 2014

STATUS approved

## A000045 Fibonacci numbers: F(n) = F(n-1) + F(n-2) with F(0) = 0 and F(1) = 1.

(Formerly M0692 N0256)

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, 17711, 28657, 46368, 75025, 121393, 196418, 317811, 514229, 832040, 1346269, 2178309, 3524578, 5702887, 9227465, 14930352, 24157817, 39088169, 63245986, 102334155 (list; graph; refs; listen; history; edit; text; internal format)

REFERENCES

LINKS

STATUS approved

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## A000041 a(n) is the number of partitions of n (the partition numbers).

+30
2953

(Formerly M0663 N0244)

1, 1, 2, 3, 5, 7, 11, 15, 22, 30, 42, 56, 77, 101, 135, 176, 231, 297, 385, 490, 627, 792, 1002, 1255, 1575, 1958, 2436, 3010, 3718, 4565, 5604, 6842, 8349, 10143, 12310, 14883, 17977, 21637, 26015, 31185, 37338, 44583, 53174, 63261, 75175, 89134, 105558, 124754, 147273, 173525 (list; graph; refs; listen; history; edit; text; internal format)

EXAMPLE

a(5) = 7 because there are seven partitions of 5, namely: {1, 1, 1, 1, 1}, {2, 1, 1, 1}, {2, 2, 1}, {3, 1, 1}, {3, 2}, {4, 1}, {5}. - Bob Selcoe, Jul 08 2014

G.f. = 1 + x + 2*x^2 + 3*x^3 + 5*x^4 + 7*x^5 + 11*x^6 + 15*x^7 + 22*x^8 + ...

G.f. = 1/q + q^23 + 2*q^47 + 3*q^71 + 5*q^95 + 7*q^119 + 11*q^143 + 15*q^167 + ...

From Gregory L. Simay, Nov 08 2015: (Start)

There are up to a(4)=5 segmented partitions of the partitions of n with exactly 4 parts. They are a(n,4, <4>), a(n,4,<3,1>), a(n,4,<2,2>), a(n,4,<2,1,1>), a(n,4,<1,1,1,1>).

The partition 8,8,8,8 is counted in a(32,4,<4>).

The partition 9,9,9,5 is counted in a(32,4,<3,1>).

The partition 11,11,5,5 is counted in a(32,4,<2,2>).

The partition 13,13,5,1 is counted in a(32,4,<2,1,1>).

The partition 14,9,6,3 is counted in a(32,4,<1,1,1,1>).

a(n odd,4,<2,2>) = 0.

a(12, 6, <2,2,2>) = a(6,3,<1,1,1>) = a(6-3,3) = a(3,3) = 1. The lone partition is 3,3,2,2,1,1.

(End)

MAPLE

```
A000041 := n -> combinat:-numbpart(n): [seq(A000041(n), n=0..50)]; # Warning: Maple 10 and 11 give incorrect answers in some
    cases: A110375.
spec := [B, {B=Set(Set(Z, card>=1))}, unlabeled ];
[seq(combstruct[count](spec, size=n), n=0..50)];
with(combstruct):ZL0:=[S, {S=Set(Cycle(Z, card>0))}, unlabeled]: seq(count(ZL0, size=n), n=0..45); # Zerinvary Lajos, Sep 24 2007
G:={P=Set(Set(Atom, card>0))}: combstruct[gfsolve](G, labeled, x); seq(combstruct[count]([P, G, unlabeled], size=i), i=0..45); # Zerinvary
    Lajos, Dec 16 2007
# Using the function EULER from Transforms (see link at the bottom of the page).
1, op(EULER([seq(1, n=1..49)])); # Peter Luschny, Aug 19 2020
```

MATHEMATICA

```
Table[ PartitionsP[n], {n, 0, 45}]
a[ n_] := SeriesCoefficient[ q^(1/24) / DedekindEta[ Log[q] / (2 Pi I)], {q, 0, n}]; (* Michael Somos, Jul 11 2011 *)
a[ n_] := SeriesCoefficient[ 1 / Product[ 1 - x^k, {k, n}], {x, 0, n}]; (* Michael Somos, Jul 11 2011 *)
CoefficientList[1/QPochhammer[q] + O[q]^100, q] (* Jean-François Alcover, Nov 25 2015 *)
```

PROG

```
(MAGMA) a:= func< n | NumberOfPartitions(n) >; [ a(n) : n in [0..10]];
(PARI) {a(n) = if( n<0, 0, polcoeff( 1 / eta(x + x * O(x^n)), n))};
(PARI) /* The Hardy-Ramanujan-Rademacher exact formula in PARI is as follows (this is no longer necessary since it is now built in to the
    numbpart command): */
Psi(n, q) = local(a, b, c); a=sqrt(2/3)*Pi/q; b=n-1/24; c=sqrt(b); (sqrt(q)/(2*sqrt(2)*b*Pi))*(a*cosh(a*c)-(sinh(a*c)/c))
L(n, q) = if(q==1, 1, sum(h=1, q-1, if(gcd(h, q)>1, 0, cos((g(h, q)-2*h*n)*Pi/q))))
g(h, q) = if(q<3, 0, sum(k=1, q-1, k*(frac(h*k/q)-1/2)))
part(n) = round(sum(q=1, max(5, 0.5*sqrt(n)), L(n, q)*Psi(n, q)))
/* Ralf Stephan, Nov 30 2002, fixed by Vaclav Kotesovec, Apr 09 2018 */
(PARI) {a(n) = numbpart(n)};
(PARI) {a(n) = if( n<0, 0, polcoeff( sum( k=1, sqrtint(n), x^k^2 / prod( i=1, k, 1 - x^i, 1 + x * O(x^n))^2, 1), n))};
(PARI) f(n)= my(v, i, k, s, t); v=vector(n, k, 0); v[n]=2; t=0; while(v[1]<n, i=2; while(v[i]==0, i++); v[i]--; s=sum(k=i, n, k*v[k]);
    while(i>1, i--; s+=i*(v[i]=(n-s)\i)); t++); t \\ Thomas Baruchel, Nov 07 2005
(PARI) a(n)=if(n<0, 0, polcoeff(exp(sum(k=1, n, x^k/(1-x^k)/k, x*O(x^n))), n)) \\ Joerg Arndt, Apr 16 2010
(MuPAD) combinat::partitions::count(i) $i=0..54 // Zerinvary Lajos, Apr 16 2007
(Sage) [number_of_partitions(n) for n in range(46)]  # Zerinvary Lajos, May 24 2009
(Sage)
@CachedFunction
def A000041(n):
    if n == 0: return 1
    S = 0; J = n-1; k = 2
    while 0 <= J:
        T = A000041(J)
        S = S+T if is_odd(k//2) else S-T
        J -= k if is_odd(k) else k//2
        k += 1
    return S
[A000041(n) for n in range(50)]  # Peter Luschny, Oct 13 2012
(Sage) # uses[EulerTransform from A166861]
a = BinaryRecurrenceSequence(1, 0)
b = EulerTransform(a)
print([b(n) for n in range(50)]) # Peter Luschny, Nov 11 2020
(Haskell)
import Data.MemoCombinators (memo2, integral)
a000041 n = a000041_list !! n
a000041_list = map (p' 1) [0..] where
   p' = memo2 integral integral p
   p _ 0 = 1
   p k m = if m < k then 0 else p' k (m - k) + p' (k + 1) m
-- Reinhard Zumkeller, Nov 03 2015, Nov 04 2013
(Maxima) num_partitions(60, list); /* Emanuele Munarini, Feb 24 2014 */
(GAP) List([1..10], n->Size(OrbitsDomain(SymmetricGroup(IsPermGroup, n), SymmetricGroup(IsPermGroup, n), \^))); # Attila Egri-Nagy, Aug 15
    2014
(Perl) use ntheory ":all"; my @p = map { partitions($_) } 0..100; say "[@p]"; # Dana Jacobsen, Sep 06 2015
(Racket)
#lang racket
; SUM(k, -inf, +inf) (-1)^k p(n-k(3k-1)/2)
; For k outside the range (1-(sqrt(1-24n))/6 to (1+sqrt(1-24n))/6) argument n-k(3k-1)/2 < 0.
; Therefore the loops below are finite. The hash avoids repeated identical computations.
(define (p n) ; Nr of partitions of n.
(hash-ref h n
  (λ ()
   (define r
```

```
    (+
     (let loop ((k 1) (n (sub1 n)) (s 0))
      (if (< n 0) s
       (loop (add1 k) (- n (* 3 k) 1) (if (odd? k) (+ s (p n)) (- s (p n))))))
     (let loop ((k -1) (n (- n 2)) (s 0))
      (if (< n 0) s
       (loop (sub1 k) (+ n (* 3 k) -2) (if (odd? k) (+ s (p n)) (- s (p n))))))))
   (hash-set! h n r)
   r)))
(define h (make-hash '((0 . 1))))
; (for ((k (in-range 0 50))) (printf "~s, " (p k))) runs in a moment.
; Jos Koot, Jun 01 2016
(Python)
from sympy.ntheory import npartitions
print([npartitions(i) for i in range(101)])  # Indranil Ghosh, Mar 17 2017
(Julia) # DedekindEta is defined in A000594
A000041List(len) = DedekindEta(len, -1)
A000041List(50) |> println # Peter Luschny, Mar 09 2018
```

CROSSREFS Cf. A000009, A000079, A000203, A001318, A008284, A065446, A078506, A113685, A132311, A145006, A145007, A147843, A152537, A168532, A173238, A173239, A173241, A173304, A174065, A174066, A174068, A176202.
For successive differences see A002865, A053445, A072380, A081094, A081095.
Antidiagonal sums of triangle A092905. a(n) = A054225(n,0).
Boustrophedon transforms: A000733, A000751.
Cf. A167376 (complement), A061260 (multisets).

KEYWORD core,easy,nonn,nice

AUTHOR N. J. A. Sloane

EXTENSIONS Additional comments from Ola Veshta (olaveshta(AT)my-deja.com), Feb 28 2001
Additional comments from Dan Fux (dan.fux(AT)OpenGaia.com or danfux(AT)OpenGaia.com), Apr 07 2001

STATUS approved

## A027750 Triangle read by rows in which row n lists the divisors of n.

1, 1, 2, 1, 3, 1, 2, 4, 1, 5, 1, 2, 3, 6, 1, 7, 1, 2, 4, 8, 1, 3, 9, 1, 2, 5, 10, 1, 11, 1, 2, 3, 4, 6, 12, 1, 13, 1, 2, 7, 14, 1, 3, 5, 15, 1, 2, 4, 8, 16, 1, 17, 1, 2, 3, 6, 9, 18, 1, 19, 1, 2, 4, 5, 10, 20, 1, 3, 7, 21, 1, 2, 11, 22, 1, 23, 1, 2, 3, 4, 6, 8, 12, 24, 1, 5, 25, 1, 2, 13, 26, 1, 3, 9, 27, 1, 2, 4, 7, 14, 28, 1, 29 (list; graph; refs; listen; history; edit; text; internal format)

OFFSET 1,3

COMMENTS Or, in the list of natural numbers (A000027), replace n with its divisors.
This gives the first elements of the ordered pairs (a,b) a >= 1, b >= 1 ordered by their product ab.
Also, row n lists the largest parts of the partitions of n whose parts are not distinct. - Omar E. Pol, Sep 17 2008
Concatenation of n-th row gives A037278(n). - Reinhard Zumkeller, Aug 07 2011
{A210208(n,k): k=1..A073093(n)} subset of {T(n,k): k=1..A000005(n)} for all n. - Reinhard Zumkeller, Mar 18 2012
Row sums give A000203. Right border gives A000027. - Omar E. Pol, Jul 29 2012
Indices of records are in A006218. - Irina Gerasimova, Feb 27 2013
The number of primes in the n-th row is omega(n) = A001221(n). - Michel Marcus, Oct 21 2015
The row polynomials P(n,x) = Sum_{k=1..A000005(n)} T(n,k)*x^k with composite n which are irreducible over the integers are given in A292226. - Wolfdieter Lang, Nov 09 2017
T(n,k) is also the number of parts in the k-th partition of n into equal parts (see example). - Omar E. Pol, Nov 20 2019

LINKS Franklin T. Adams-Watters, Rows 1..1000, flattened
Franklin T. Adams-Watters, Rows 1..10000
Omar E. Pol, Illustration of initial terms, (2009).
Eric Weisstein's World of Mathematics, Divisor
Wikipedia, Table of divisors
Index entries for sequences related to divisors of numbers

FORMULA a(A006218(n-1) + k) = k-divisor of n, 1 <= k <= A000005(n). - Reinhard Zumkeller, May 10 2006
T(n,k) = n / A056538(n,k) = A056538(n,n-k+1), 1 <= k <= A000005(n). - Reinhard Zumkeller, Sep 28 2014

EXAMPLE Triangle begins:
1;
1, 2;
1, 3;
1, 2, 4;
1, 5;
1, 2, 3, 6;
1, 7;
1, 2, 4, 8;
1, 3, 9;
1, 2, 5, 10;
1, 11;
1, 2, 3, 4, 6, 12;
...
For n = 6 the partitions of 6 into equal parts are [6], [3,3], [2,2,2], [1,1,1,1,1,1], so the number of parts are [1, 2, 3, 6] respectively, the same as the divisors of 6. - Omar E. Pol, Nov 20 2019

MAPLE seq(op(numtheory:-divisors(a)), a = 1 .. 20) # **_Matt C. Anderson_**, May 15 2017

MATHEMATICA Flatten[ Table[ Flatten [ Divisors[ n ] ], {n, 1, 30} ] ]

PROG
```
(MAGMA) [Divisors(n) : n in [1..20]];
(Haskell)
a027750 n k = a027750_row n !! (k-1)
a027750_row n = filter ((== 0) . (mod n)) [1..n]
a027750_tabf = map a027750_row [1..]
-- Reinhard Zumkeller, Jan 15 2011, Oct 21 2010
(PARI) v=List(); for(n=1, 20, fordiv(n, d, listput(v, d))); Vec(v) \\ Charles R Greathouse IV, Apr 28 2011
(Python)
from sympy import divisors
for n in range(1, 16):
    print(divisors(n)) # Indranil Ghosh, Mar 30 2017
```

CROSSREFS Cf. A000005 (row length), A001221, A027749, A027751, A056534, A056538, A127093, A135010, A161700, A163280, A240698 (partial sums of rows), A240694 (partial products of rows), A247795 (parities), A292226, A244051.

KEYWORD nonn,easy,tabf,look

AUTHOR N. J. A. Sloane

EXTENSIONS More terms from Scott Lindhurst (ScottL(AT)alumni.princeton.edu)

STATUS approved

## A016789 a(n) = 3*n + 2.

2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68, 71, 74, 77, 80, 83, 86, 89, 92, 95, 98, 101, 104, 107, 110, 113, 116, 119, 122, 125, 128, 131, 134, 137, 140, 143, 146, 149, 152, 155, 158, 161, 164, 167, 170, 173, 176, 179 (list; graph; refs; listen; history; edit; text; internal format)

OFFSET 0,1

COMMENTS
Except for 1, n such that Sum_{k=1..n} (k mod 3)*binomial(n,k) is a power of 2. - Benoit Cloitre, Oct 17 2002
The sequence 0,0,2,0,0,5,0,0,8,... has a(n) = n*(1 + cos(2*Pi*n/3 + Pi/3) - sqrt(3)*sin(2*Pi*n + Pi/3))/3 and o.g.f. x^2(2+x^3)/(1-x^3)^2. - Paul Barry, Jan 28 2004 [Artur Jasinski, Dec 11 2007, remarks that this should read (3*n + 2)*(1 + cos(2*Pi*(3*n + 2)/3 + Pi/3) - sqrt(3)*sin(2*Pi*(3*n + 2)/3 + Pi/3))/3.]
Except for 2, exponents e such that x^e + x + 1 is reducible. - N. J. A. Sloane, Jul 19 2005
a(n) = A125199(n+1,1). - Reinhard Zumkeller, Nov 24 2006
The trajectory of these numbers under iteration of sum of cubes of digits eventually turns out to be 371 or 407 (47 is the first of the second kind). - Avik Roy (avik_3.1416(AT)yahoo.co.in), Jan 19 2009
Union of A165334 and A165335. - Reinhard Zumkeller, Sep 17 2009
a(n) is the set of numbers congruent to{2,5,8} mod 9. - Gary Detlefs, Mar 07 2010
It appears that a(n) is the set of all values of y such that y^3 = kn + 2 for integer k. - Gary Detlefs, Mar 08 2010
These numbers do not occur in A000217 (triangular numbers). - Arkadiusz Wesolowski, Jan 08 2012
A089911(2*a(n)) = 9. - Reinhard Zumkeller, Jul 05 2013
Also indices of even Bell numbers (A000110). - Enrique Pérez Herrero, Sep 10 2013
Central terms of the triangle A108872. - Reinhard Zumkeller, Oct 01 2014
A092942(a(n)) = 1 for n > 0. - Reinhard Zumkeller, Dec 13 2014
a(n-1), n >= 1, is also the complex dimension of the manifold E(S), the set of all second order irreducible Fuchsian differential equations defined on P^1 = **C** U {oo}, having singular points at most in S = {a_1, ..., a_n, a_{n+1} = oo}, a subset of P^1. See the Iwasaki et al. reference, Proposition 2.1.3., p. 149. - Wolfdieter Lang, Apr 22 2016
Except for 2, exponents for which 1 + x^(n-1) + x^n is reducible. - Ron Knott, Sep 16 2016
The reciprocal sum of 8 distinct items from this sequence can be made equal to 1, with these terms: 2, 5, 8, 14, 20, 35, 41, 1640. - Jinyuan Wang, Nov 16 2018
There are no positive integers x, y, z such that 1/a(x) = 1/a(y) + 1/a(z). - Jinyuan Wang, Dec 31 2018
As a set of positive integers, it is the set sum S + S where S is the set of numbers in A016777. - Michael Somos, May 27 2019

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K. Iwasaki, H. Kimura, S. Shimomura and M. Yoshida, From Gauss to Painlevé, Vieweg, 1991. p. 149.
L. B. W. Jolley, "Summation of Series", Dover Publications, 1961, p. 16.
Konrad Knopp, Theory and Application of Infinite Series, Dover, p. 269

LINKS
G. C. Greubel, Table of n, a(n) for n = 0..10000
L. Euler, Observatio de summis divisorum p. 9.
L. Euler, An observation on the sums of divisors, arXiv:math/0411587 [math.HO], 2004-2009, p. 9.
INRIA Algorithms Project, Encyclopedia of Combinatorial Structures 937
Tanya Khovanova, Recursive Sequences
Konrad Knopp, Theorie und Anwendung der unendlichen Reihen, Berlin, J. Springer, 1922. (Original German edition of "Theory and Application of Infinite Series")
Luis Manuel Rivera, Integer sequences and k-commuting permutations, arXiv preprint arXiv:1406.3081 [math.CO], 2014-2015.
Index entries for linear recurrences with constant coefficients, signature (2,-1).

FORMULA
G.f.: (2+x)/(1-x)^2.
a(n) = 3 + a(n-1).
a(n) = 1 + A016777(n).
a(n) = A124388(n)/9.
Sum_{n>=1} (-1)^n/a(n) = (1/3)*(Pi/sqrt(3) - log(2)). - Benoit Cloitre, Apr 05 2002
1/2 - 1/5 + 1/8 - 1/11 + ... = (1/3)*(Pi/sqrt(3) - log 2). [Jolley] - Gary W. Adamson, Dec 16 2006
Sum_{n>=0} 1/(a(2*n)*a(2*n+1)) = (Pi/sqrt(3) - log 2)/9 = 0.12451569... (see A196548). [Jolley p. 48 eq (263)]
a(n) = 2*a(n-1) - a(n-2); a(0)=2, a(1)=5. - Philippe Deléham, Nov 03 2008
a(n) = 6*n - a(n-1) + 1 with a(0)=2. - Vincenzo Librandi, Aug 25 2010
a(n) = n XOR A005351(n+1) XOR A005352(n+1) (conjectured). - _Gilian Breysens_, Jul 21 2017
E.g.f.: (2 + 3*x)*exp(x). - _G. **C.** Greubel_, Nov 02 2018
a(n) = A005449(n+1) - A005449(n). - Jinyuan Wang, Feb 03 2019
a(n) = -A016777(-1-n) for all n in Z. - Michael Somos, May 27 2019

EXAMPLE
G.f. = 2 + 5*x + 8*x^2 + 11*x^3 + 14*x^4 + 17*x^5 + 20*x^6 + ... - Michael Somos, May 27 2019

MAPLE
```
seq(3*n+2, n = 0 .. 50); # _Matt C. Anderson_, May 18 2017
```

MATHEMATICA
```
Range[2, 500, 3] (* Vladimir Joseph Stephan Orlovsky, May 26 2011 *)
LinearRecurrence[{2, -1}, {2, 5}, 70] (* Harvey P. Dale, Aug 11 2021 *)
```

PROG
```
(Haskell)
a016789 = (+ 2) . (* 3)  -- Reinhard Zumkeller, Jul 05 2013
(PARI) vector(100, n, 3*n-1) \\ Derek Orr, Apr 13 2015
(MAGMA) [3*n+2: n in [0..80]]; // Vincenzo Librandi, Apr 14 2015
(GAP) List([0..70], n->3*n+2); # Muniru A Asiru, Nov 02 2018
(Python) for n in range(0, 100): print(3*n+2, end=', ') # Stefano Spezia, Nov 21 2018
```

CROSSREFS
First differences of A005449.
Cf. A002939, A017041, A017485, A125202, A017233, A179896, A017617, A016957, A008544 (partial products), A032766, A016777, A124388, A005351.
Cf. A087370.
Cf. similar sequences with closed form (2*k-1)*n+k listed in A269044.

KEYWORD nonn,easy,changed

AUTHOR N. J. A. Sloane

STATUS approved

# A005846 Primes of the form n^2 + n + 41.
(Formerly M5273)

41, 43, 47, 53, 61, 71, 83, 97, 113, 131, 151, 173, 197, 223, 251, 281, 313, 347, 383, 421, 461, 503, 547, 593, 641, 691, 743, 797, 853, 911, 971, 1033, 1097, 1163, 1231, 1301, 1373, 1447, 1523, 1601, 1847, 1933, 2111, 2203, 2297, 2393, 2591, 2693, 2797 (list; graph; refs; listen; history; edit; text; internal format)

OFFSET 1,1

COMMENTS
Note that 41 is the largest of Euler's Lucky numbers (A014556). - Lekraj Beedassy, Apr 22 2004
a(n) = A117530(13, n) for n <= 13: a(1) = A117530(13, 1) = A014556(6) = 41, A117531(13) = 13. - Reinhard Zumkeller, Mar 26 2006
The link to E. Wegrzynowski contains the following incorrect statement: "It is possible to find a polynomial of the form n^2 + n + B that gives prime numbers for n = 0, ..., A, A being any number." It is known that the maximum is A = 39 for B = 41. - Luis Rodriguez (luiroto(AT)yahoo.com), Jun 22 2008
Contrary to the last comment, Mollin's Theorem 2.1 shows that any A is possible if the Prime k-tuples Conjecture is assumed. - T. D. Noe, Aug 31 2009
a(n) can be generated by a recurrence based on the gcd in the type of Eric Rowland and Aldrich Stevens. See the recurrence in PARI under PROG. - Mike Winkler, Oct 02 2013
These primes are not prime in O_(Q(sqrt(-163)). Given p = n^2 + n + 41, we have ((2n + 1)/2 - sqrt(-163)/2)((2n + 1)/2 + sqrt(-163)/2) = p, e.g., 1601 = 39^2 + 39 + 41 = (79/2 - sqrt(-163)/2)(79/2 + sqrt(-163)/2). - Alonso del Arte, Nov 03 2017
From Peter Bala, Apr 15 2018: (Start)
The polynomial P(n) := n^2 + n + 41 takes distinct prime values for the 40 consecutive integers n = 0 to 39. It follows that the polynomial P(n-40) takes prime values for the 80 consecutive integers n = 0 to 79, consisting of the 40 primes above each taken twice. We note two consequences of this fact.
1) The polynomial P(2*n-40) = 4*n^2 - 158*n + 1601 also takes prime values for the 40 consecutive integers n = 0 to 39.
2) The polynomial P(3*n-40) = 9*n^2 - 237*n + 1601 takes prime values for the 27 consecutive integers n = 0 to 26 ( = floor(79/3)). In addition, calculation shows that P(3*n-40) also takes prime values for n from -13 to -1. Equivalently put, the polynomial P(3*n-79) = 9*n^2 - 471*n + 6203 takes prime values for the 40 consecutive integers n = 0 to 39. This result is due to Higgins. Cf. A007635 and A048059. (End)

| | |
|---|---|
| REFERENCES | O. Higgins, Another long string of primes, J. Rec. Math., 14 (1981/2) 185.<br>Paulo Ribenboim, The Book of Prime Number Records. Springer-Verlag, NY, 2nd ed., 1989, p. 137.<br>N. J. A. Sloane and Simon Plouffe, The Encyclopedia of Integer Sequences, Academic Press, 1995 (includes this sequence). |
| LINKS | Zak Seidov, Table of n, a(n) for n = 1..10000.<br>Phil Carmody, Drag Racing Prime Numbers! - Vladimir Joseph Stephan Orlovsky, Jul 24 2011<br>Richard K. Guy, The strong law of small numbers. Amer. Math. Monthly 95 (1988), no. 8, 697-712. [Annotated scanned copy]<br>R. A. Mollin, Prime-producing quadratics, Amer. Math. Monthly 104 (1997), 529-544.<br>E. Wegrzynowski, Les formules simples qui donnent des nombres premiers en grande quantité<br>Eric Weisstein's World of Mathematics, Euler Prime<br>Eric Weisstein's World of Mathematics, Prime-Generating Polynomial |
| FORMULA | a(n) = A056561(n)^2 + A056561(n) + 41. |
| EXAMPLE | a(39) = 1601 = 39^2 + 39 + 41 is in the sequence because it is prime.<br>1681 = 40^2 + 40 + 41 is not in the sequence because 1681 = 41*41. |
| MAPLE | for y from 0 to 10 do<br>U := y^2+y+41;<br>if isprime(U) = true then print(U) end if ;<br>end do:<br># _**Matt C. Anderson**_, Jan 04 2013 |
| MATHEMATICA | Select[Table[n^2 + n + 41, {n, 0, 59}], PrimeQ] (* Alonso del Arte, Dec 08 2011 *) |
| PROG | (PARI) for(n=1, 1e3, if(isprime(k=n^2+n+41), print1(k", "))) \\ Charles R Greathouse IV, Jul 25 2011<br>(Haskell)<br>a005846 n = a005846_list !! (n-1)<br>a005846_list = filter ((== 1) . a010051) a202018_list<br>-- Reinhard Zumkeller, Dec 09 2011<br>(PARI) {k=2; n=1; for(x=1, 100000, f=x^2+x+41; g=x^2+3*x+43; a=gcd(f, g-k); if(a>1, k=k+2); if(a==x+2-k/2, print(n" "a); n++))} \\ Mike Winkler, Oct 02 2013<br>(GAP) Filtered(List([0..100], n->n^2+n+41), IsPrime); # Muniru A Asiru, Apr 22 2018<br>(MAGMA) [a: n in [0..55] \| IsPrime(a) where a is n^2+n+ 41]; // Vincenzo Librandi, Apr 24 2018 |
| CROSSREFS | Cf. A048988, A007634, A056561, A002378, A007635.<br>Intersection of A000040 and A202018; A010051.<br>Cf. A048059. |
| KEYWORD | nonn,easy |
| AUTHOR | N. J. A. Sloane |
| EXTENSIONS | More terms from Henry Bottomley, Jun 26 2000 |
| STATUS | approved |

t this time it is lists of prime numbers.
That is, special k-tuples, lists of prime numbers with certain restrictions.
Did work on k-tuples for k in {2,3,4, 5, 7, 8, 9, 10, 11,.12, 13,
Oeis.org/A022004
oeis.org/A022005
oeis.org/A022545
oeis.org/A022546
oeis.org/A022547
oeis.org/A022548oeis.org/A027569027570
oeis.org/A046052 with title, Number of prime factors of Fermat F(n).
oeis.org/A055390 concerning that trinomial f(n) = n^2 + n + 41.
oeis.org/A133467 concerning a recursive relation.
oeis.org/A194565 concerning f(n) and parabolas
oeis.org/A213601
oeis.org/A213645
3*z^2 + z + 3oeis.org/A257139
oeis.org/A257140
oeis.org/A257141
oeis.org/A277338 with title Reverse and Add! Sequence starting with 295
(p, p+2, p+14)

## A007530 Prime quadruples: numbers k such that k, k+2, k+6, k+8 are all prime.

(Formerly M3816)

5, 11, 101, 191, 821, 1481, 1871, 2081, 3251, 3461, 5651, 9431, 13001, 15641, 15731, 16061, 18041, 18911, 19421, 21011, 22271, 25301, 31721, 34841, 43
67211, 69491, 72221, 77261, 79691, 81041, 82721, 88811, 97841, 99131 (list; graph; refs; listen; history; edit; text; internal format)

| | |
|---|---|
| OFFSET | 1,1 |
| COMMENTS | Except for the first term, 5, all terms == 11 (mod 30). - Zak Seidov, Dec 04 2008<br>Some further values: For k = 1, ..., 10, a(k*10^3) = 11721791, 31210841, 54112601, 78984791, 106583831, 136466501, 165939791, 265201421. - M. F. Hasler, May 04 2009<br>k is the first prime of 2 consecutive twin prime pairs. - Daniel Forgues, Aug 01 2009<br>The prime quadruples of form p + (0, 2, 6, 8) have the quadruple congruence class (-1, +1, -1, +1) (mod 6). - Daniel Forgues,<br>s = (p+8)-(p) = 8 is the smallest s giving an admissible prime quadruple form, for which the only admissible form is p + (0, 2<br>6, 8) is the only form not covering all the congruence classes for any prime <= 4. Since s is smallest, these prime quadru<br>constellations (or prime quadruplets), i.e., they contain consecutive primes. - Daniel Forgues, Aug 12 2009 |

Except for the first term, 5, all prime quadruples are of the form (15k-4, 15k-2, 15k+2, 15k+4), with k >= 1, and so are centered on 15k. - Daniel Forgues, Aug 12 2009
Solutions of the equation n'+(n+2)'+(n+6)'+(n+8)'=4, where n' is the arithmetic derivative of n'. - Paolo P. Lava, Nov 09 2012
Subsequence of A022004. - R. J. Mathar, Feb 10 2013
The quadruplets are listed in A136162. - M. F. Hasler, Apr 20 2013
Starting at a(2) and examining the first 50 terms, (a(n)+4)/15 is a prime in 8 cases and a semiprime in 21; the last 18 terms have 2 primes and 11 semiprimes. Do the number of semiprimes continue to occur greater than mere chance? - J. M. Bergot, Apr 27 2015

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H. Rademacher, Lectures on Elementary Number Theory. Blaisdell, NY, 1964, p. 4.
N. J. A. Sloane and Simon Plouffe, The Encyclopedia of Integer Sequences, Academic Press, 1995 (includes this sequence).

LINKS

Matt C. Anderson, Table of n, a(n) for n = 1..10000 (terms 1..1000 from T. D. Noe).
C. K. Caldwell, The Prime Glossary, prime quadruple
T. R. Nicely, Enumeration to 1.6e15 of the prime quadruplets
H. Riesel, Prime numbers and computer methods for factorization, Progress in Mathematics, Vol. 57, Birkhäuser, Boston, 1985, ISBN: 978-0-8176-8297-2, Chap. 4, see p. 65.
Eric Weisstein's World of Mathematics, Prime Quadruplet

FORMULA

a(n) = 11 + 30*A014561(n-1) for n > 1. - M. F. Hasler, May 04 2009

EXAMPLE

From M. F. Hasler, May 04 2009: (Start)
a(1)=5 is the start of the first prime quadruplet, {5,7,11,13}.
a(2)=11 is the start of the second prime quadruplet, {11,13,17,19}, and all other prime quadruplets differ from this one by a multiple of 30.
a(100)=470081 is the start of the 100th prime quadruplet;
a(500)=4370081 is the start of the 500th prime quadruplet.
a(167)=1002341 is the least quadruplet prime beyond 10^6. (End)

MAPLE

```
A007530:=proc(q)
local n;
for n from 1 to q do
   if isprime(n) and isprime (n+2) and isprime(n+6) and isprime (n+8) then print(n); fi;
od; end:
A007530(10000000000);  # Paolo P. Lava, Jan 30 2013
```

MATHEMATICA

```
A007530 = Select[Range[1, 10^5 - 1, 2], Union[PrimeQ[# + {0, 2, 6, 8}]] == {True} &] (* Alonso del Arte, Sep 24 2011 *)
Select[Prime[Range[10000]], AllTrue[#+{2, 6, 8}, PrimeQ]&] (* The program uses the AllTrue function from Mathematica version 10 *) (* Harvey P. Dale, Mar 11 2019 *)
```

AUTHOR

N. J. A. Sloane, Robert G. Wilson v

EXTENSIONS

More terms from Warut Roonguthai
Incorrect formula and Mathematica program removed by N. J. A. Sloane, Dec 04 2008, at the suggestion of Zak Seidov
Values up to a(1000) checked with the given PARI code by M. F. Hasler, May 04 2009

STATUS

approved