Odd abundant numbers of the forms 2*k*P-1001*k and 2*k*P+5005*k where P are Poulet numbers

Marius Coman
email: mariuscoman13@gmail.com

Abstract. In this paper I make the following four conjectures: (I) All numbers of the form 2*k*41041 – 1001*k, where k odd, are odd abundant numbers; the sequence of these numbers is 81081, 243243, 405405, 567567, 729729, 891891, 1054053, 1216215...(II) All numbers of the form 2*k*101101 + 5005*k, where k odd, are odd abundant numbers; the sequence of these numbers is 207207, 621621, 1036035, 1450449, 1864863, 2279277, 2693691, 3108105...(III) There exist an infinity of Poulet numbers P such that all the numbers 2*k*P – 1001*k, where k odd, are odd abundant numbers; (IV) There exist an infinity of Poulet numbers P such that all the numbers 2*k*P + 5005*k, where k odd, are odd abundant numbers.

Introduction

In a previous paper, "Odd abundant numbers of the form 2*k*P-(345 +30*(k - 1)) where P are Poulet numbers", I conjectured that the terms of the sequences 2*k*645 – (345 + 30*(k – 1) respectively 2*k*1905 – (345 + 30*(k – 1) are odd abundant numbers for any k; but all the terms there are divisible by 5, which, though represent the vast majority of the set of odd abundant numbers (only 26 from the first 1996 terms are not divisible by 5 – see A005231 in OEIS), are not the only terms of this set; among the terms of the set of odd abundant numbers there exist also interesting subsets not divisible by 5, like repnumbers (I defined, after the model of "repdigits", "repnumber" as the numbers which contain same number repetead twice or more – for instance 134134 or 765765765): from the first 25 term of the sequence "odd abundant numbers not divisible by 5" (A064001 in OEIS), 17 are "repnumbers". The two sequences presented in this paper rely on this type of numbers.

Notes:
See also the sequence A001567 in OEIS for Poulet numbers.
See also the sequence A216023 in OEIS (submitted by me) for Poulet numbers divisible by 5).

Conjecture I:

All numbers of the form 2*k*41041 – 1001*k, where k odd, are odd abundant numbers.

The sequence of these odd abundant numbers:

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:    81081    = 2*1*41041 - 1*1001;
:    243243   = 2*3*41041 - 3*1001;
:    405405   = 2*5*41041 - 5*1001;
:    567567   = 2*7*41041 - 7*1001;
:    729729   = 2*9*41041 - 9*1001;
:    891891   = 2*11*41041 - 11*1001;
:    1054053  = 2*13*41041 - 13*1001;
:    1216215  = 2*15*41041 - 15*1001;
     (...)
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Conjecture II:

All numbers of the form 2*k*41041 - 1001*k, where k odd, are odd abundant numbers.

The sequence of these odd abundant numbers:

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:    207207   = 2*1*101101 + 1*5005;
:    621621   = 2*3*101101 + 3*5005;
:    1036035  = 2*5*101101 + 5*5005;
:    1450449  = 2*7*101101 + 7*5005;
:    1864963  = 2*9*101101 + 9*5005;
:    2279277  = 2*11*101101 + 11*5005;
:    2693691  = 2*13*101101 + 13*5005;
:    3108105  = 2*15*101101 + 15*5005;
     (...)
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Conjecture III:

There exist an infinity of Poulet numbers P such that all the numbers 2*k*P - 1001*k, where k odd, are odd abundant numbers.

Conjecture IV:

There exist an infinity of Poulet numbers P such that all the numbers 2*k*P + 5005*k, where k odd, are odd abundant numbers.