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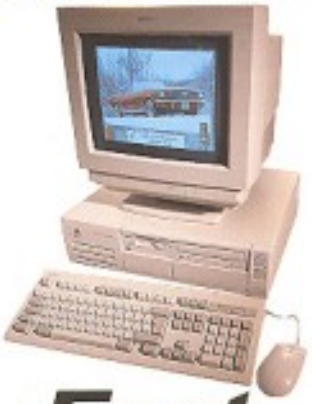

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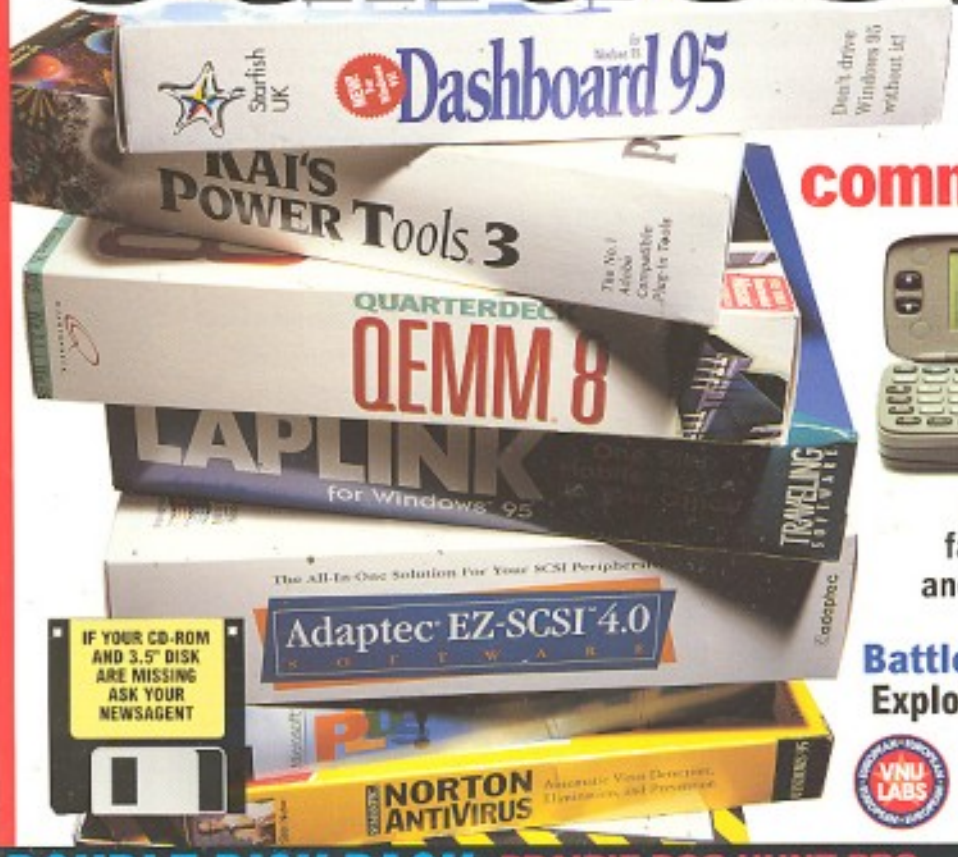

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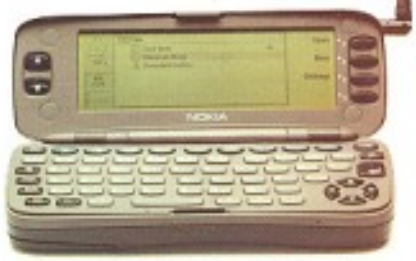

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Sequence of events

Descriptive Number Sequences,
presented by Mike Mudgec

HIS APPARENTLY NEW AND
certainly fascinating topic has been
suggested by Jonathan Ayres of Leeds.
The sequences are denoted by dsn(m)
where n is the index of the sequence and
m is the original number. There is a
simplified version of the
GLEICHNISZHLEN-RIEHE sequence
with the property that the next number in
the sequence describes the number of
each digit in the previous number.

So, taking the case of ds(0) in Fig 1.

This leads to my first question:

(1) Is this an exhaustive list of self-
descriptive numbers?

Sequences which do not lead to self-descriptive numbers instead lead to amicable descriptive sequences. For example, in the case of ds(4), see Fig 2.

ds10(40) = ds12(40), so this sequence has entered into a recurring sequence of numbers with a period of 2, because dsn(40) = dsn+2(40), n=^>10.

104122232415 and 103142132415

Fig 1

Gleichniszhlen-Riehe sequence for ds(0)

ds^O) = 10 (1 zero in previous number, 1 is the digit

number and 0 is the occurrence number)

ds2(0) = 1011 (1 zero and 1 one in previous number)

ds3(0) = 1031 (1 zero and 3 ones in previous number)

ds4(0) = 102113 (NB. Because there are no twos in previous number the 0

twos are not listed, so ds4(0)=1021 13 instead of 10210213.

(I will deal with this case later.)

ds5(0) = 10311213

ds6(0) = 10411223

ds7(0) = 1031221314

ds8(0) = 1041222314

ds9(0) = 1031321324

ds10(0) = 1031223314

dSntO) = 1031223314, and so on

After dsl 1(0) all further numbers in the sequence are equal to 1031223314. This is a self-descriptive number, i.e. it describes itself. For example, 1031223314 is composed of 1 zero, 3 ones, 2 twos, 3 threes and 1 four = 1031223314.

Fig 2

Amicable descriptive sequences for ds(40)

ds1 (40) = 1014

ds2(40) = 103114

ds3(40) = 10311214

ds4(40) = 1041121314

ds5(40) = 1051121324

ds6(40) = 104122131415

ds7(40) = 105122132415

d S8 (40) = 104132131425

d S9 (40) = 104122232415

ds10(40) = 103142132415

dSii(40) = 104122232415

ds12(40) = 103142132415, and so on

From my investigations the self-

descriptive numbers are:

are known as an amicable descriptive pair of numbers, because

22

10311233

21322314, 21322315, 21322316,
21322317, 21322318, 21322319
31123314, 31123315, 31123316,
31123317, 31123318, 31123319 *
1031223314, 1031223315, 1031223316,
1031223317, 1031223318, 1031223319
3122331415, 3122331416, 3122331417,
3122331418, 3122331419 *

The asterisked lines are related families because the final In is not important as n is not involved with the rest of the number.

ds1(104122232415) = 103142132415
and ds1 (103142132415) = 104122232415
There are also amicable descriptive

triplets such as

10414213142516 - 10512213341516 -
10412223142516

which have a period of 3. The amicable descriptive sequences are shown in Fig 3.

From this I define ds(x) to be the lowest recurring value of dsn(x), so that ds(x) is either a self-descriptive number or ds(x) is the lowest member of an amicable sequence, i.e. ds(0) = 1031223314.

Fig 3

Amicable descriptive sequences for triplets

Period 2

103142132415 - 104122232415
314213241516 - 412223241516,
314213241517 - 412223241517,
314213241518 - 412223241518,
314213241519 - 412223241519

41421314251617 - 51221334151617,

41421314251618 - 51221334151618,

41421314251619 - 51221334151619

1051421314152617 - 1061221324251617,

1051421314152618 - 1061221324251618,

1051421314152619 - 1061221324251619

5142131415261718 - 6122132425161718,

5142131415261719 - 6122132425161719

106142131415162718 -

107122132415261718,

106142131415162719 -

107122132415261719,

614213141516271819 -

712213241526171819,

10714213141516172819 -

10812213241516271819

Period 3

10414213142516

10512223142516

10414213142517

10512223142517

10414213142518

10512223142518

10414213142519

10512223142519

41421314251617

51222314251617

41421314251618

51222314251619

41421314251619

51222314251619

10512213341516 -

10512213341517 -

10512213341518 -

10512213341519 -

51221334151617 -

51221334151618 -

51221334151619 -

(2) Is this a complete list of the amicable descriptive sequences?

(3) Are there any of higher period?

Any investigations of these three questions may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St. Clears, Carmarthenshire SA334 AQ, tel 01994 231 1 21 , to arrive by 1 st September 1 996. All material received will be judged using suitable subjective criteria and a prize will be awarded to the “best” response arriving by the closing date. ml