7.1 Arithmetic Sequences

First some terminology:

sequence
an ordered list of numbers

$-4, 1, 4, 9, 10, 11, 12, 100$

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term
a number in a sequence. Subscripts are usually used to identify the positions of the terms.

$t_3 = 3^{rd}$ term $\quad t_6 = 11$

$= 4$

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arithmetic sequence
a sequence that has the same difference, the **common difference**, between any pair of consecutive terms

$4, 9, 14, 19, 24 \ldots$

+5 +5

d

Terminology continued....

recursive sequence

a sequence for which one term (or more) is given and each successive term is determined from the previous term(s)

1, 1, 2, 3, 5, 8, 13, 21, 34 ...

Fibonacci

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general term

a formula, labelled t_n, that expresses each term of a sequence as a function of its position. For example, if the general term is $t_n = 2n$, then to calculate the 12th term (t_{12}), substitute $n = 12$.

$$t_{12} = 2(12)$$
$$= 24$$

$$t_n = a + (n-1)d$$

t_1

difference

Some examples:

1. Determine if the sequence is arithmetic. If it is, state the general term, then find the 40th term.

$3, 12, 21, 30, \ldots$

9 9 9

$d = 9 \quad a = 3$

$t_n = a + (n-1)d$

$t_n = 3 + (n-1)(9)$

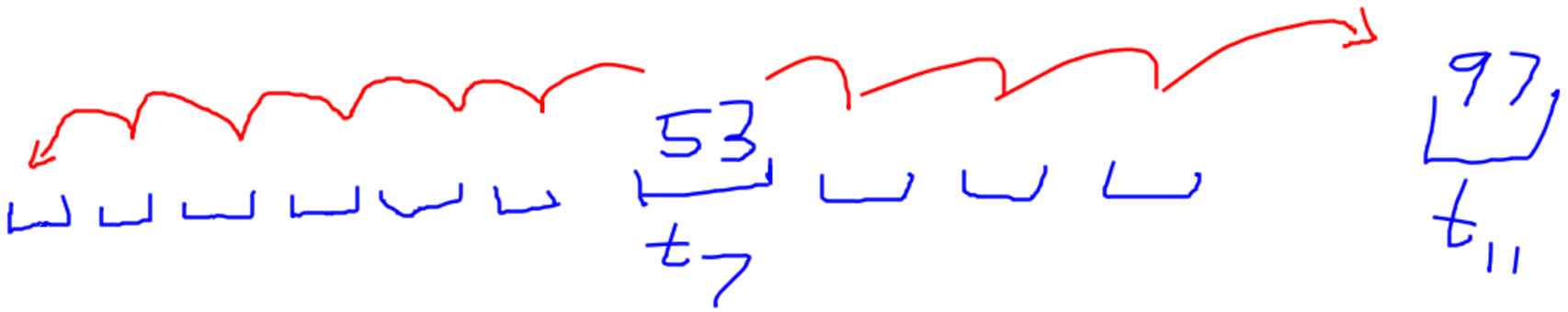
$t_n = 3 + 9n - 9$

$\Rightarrow t_n = 9n - 6$

$t_{40} = 9(40) - 6$

$t_{40} = 354$

2. The 7th term of an arithmetic sequence is 53 and the 11th term is 97. Find the common difference and the first term.



$$t_{11} - t_7 = 97 - 53 = 44$$

$$4d = 44$$

$$d = 11$$

$$53 - 6(11)$$

$$t_1 = -13$$

3. How many terms in the finite arithmetic sequence?

$18, 11, 4, -3 \ldots -129$

a, -7

a, d, n

$t_n = 18 + (n-1)(-7)$

$-129 = 18 + (n-1)(-7)$

$-147 = (n-1)(-7)$

$21 = n-1$

$22 = n$