1

Sequence S consists of 24 nonzero integers. If each term in S after the second is the product of the previous two terms, how many terms in S are negative?

(1) The third term in S is positive
(2) The fourth term in S is negative

2

An infinite sequence of positive integers is called a perfect sequence. If each term in the sequence is a perfect number, that is, if each term can be expressed as the sum of its divisors, excluding itself. For example, 6 is a perfect number, as its divisors, 1, 2, and 3, sum to 6. Is the infinite sequence S a perfect sequence?

(1) Exactly one term in S is a prime number.
(2) In sequence S, each term after the first in S has exactly 3 divisors.

3

A set of nonnegative integers consists of {x, x + 7, 2x, y, y + 5}. The numbers of this set have four distinct values. What is its average (arithmetic mean)?

(1) $x \neq 5$
(2) $4y + 12 = 6(y + 2)$

4

In the sequence of positive numbers x_1, x_2, x_3, ..., what is the value of x_1?

(1) $x_i = \frac{x_{(i-1)}}{2}$ for all integers $i > 1$.

(2) $x_5 = \frac{x_4}{x_4 + 1}$