MATH 1200 : WORKSHEET

The following questions are about subsets of the integers $\{1, 2, 3, \ldots, 10\}$. The numbers that are in the subset are sometimes referred to as the elements of the set and the number of elements is the size of the subset.

Each statement below is either:

(1) Always true for all subsets S of $\{1, 2, 3, \ldots, 10\}$
(2) True for some subsets S, false for others
(3) Always false for all subsets S of $\{1, 2, 3, \ldots, 10\}$

Give an example of one subset that makes the following statements true and one subset that makes the statement false (if possible), and explain why your subsets make the statement true or false. If the sentence is always true or always false for all subsets of $\{1, 2, 3, \ldots, 10\}$, then explain why.

(1) For all x, if x is an element of S, $x + 4$ is also an element in S.
(2) If S contains at least three elements, then the sum of the elements is at least 7.
(3) If S has more than 5 elements, then S contains an even number.
(4) For every x in S, if x is prime, then $x + 1$ is in S.
(5) If S contains 1 and 10 and the size of S is more than 7, then the largest value in S less than 10 is at least 5.
(6) There is an x in S such that either x is odd and prime or $3x$ is in S.