## Question 72480:

Let $S$ be a nonempty subset of plane $R^2$, it is known that every point $(x, y)$ in $S$ satisfies "if $x > 0$, then $y > 0$". Consider the following properties possibly satisfied by points $(x, y)$ in $S$:

(I) If $x \leq 0$, then $y \leq 0$.

(II) If $y \leq 0$, then $x \leq 0$.

(III) If $y > 0$, then $x > 0$.

Which of the above properties will have to be satisfied by all points $(x, y)$ in $S$?

(a) (II) only

(b) (III) only

(c) (I) and (II)

(d) (I) and (III)

(e) (II) and (III)

## Solution:

(I), (III) The point $(-5, 5)$ lies in $S$. This is a counterexample.

(II) If $y \leq 0$ and $x$ is not less or equal to 0, then $y \leq 0$ and $x > 0$, then $y \leq 0$ and $y > 0$. This is a contradiction.

## Answer:

(a) (II) only.