Problem 1.4 *Suppose that the precondition (of Algorithm 1.1) is changed to say:*

$$x \geq 0 \wedge y > 0 \wedge x, y \in \mathbb{Z}$$

where $\mathbb{Z} = \{\ldots, -2, -1, 0, 1, 2, \ldots\}$. *Is the Algorithm still correct in this case?*

Solution:
The original precondition (with which the algorithm is correct) is:

$$x \geq 0 \wedge y > 0 \wedge x, y \in \mathbb{N}$$

where $\mathbb{N} = \{0, 1, 2, \ldots\}$. So our work has already been done for us; any member of $\mathbb{Z}$ which is ≥ 0 is also in $\mathbb{N}$ (and any member of $\mathbb{N}$ is in $\mathbb{Z}$), so these preconditions are equivalent. Given that the algorithm was correct under the original precondition, it is also correct under the new one.