Let \( t \) be an extended natural time variable. Is the following specification implementable?

(a) \( \forall n: \text{nat} \cdot \mathcal{M}_n = n \land \mathcal{T}_n = t \)

(b) \( \forall n: \text{nat} \cdot \mathcal{M}_{w+n} = n - t \land \mathcal{T}_{w+n} = t - n \)

(c) \( \forall n: \text{nat} \cdot \mathcal{M}_{r+n} = n \land \mathcal{T}_{r+n} = t \)

(d) \( \mathcal{M}_w = \mathcal{T}_w = t - 1 \)

After trying the question, scroll down to the solution.
(a) \[\forall n: \text{nat} \cdot M_n = n \land T_n = t\]

§ No. If \(w > 0\) and \(n = 0\) we are writing a message that was already sent.

(b) \[\forall n: \text{nat} \cdot M_{w+n} = n - t \land T_{w+n} = t - n\]

§ No. When \(n = 1\) we are specifying a time \(t - 1\) that is before now \(t\).

(c) \[\forall n: \text{nat} \cdot M_{r+n} = n \land T_{r+n} = t\]

§ No. If \(w > r\) and \(n = 0\) then \(r + n < w\), so we are writing a message that was already sent.

(d) \[M_w = T_w = t - 1\]

§ No because the time of this message \(t - 1\) is before now \(t\).