

522 Let  $t$  be an extended natural time variable. Is the following specification implementable?

- (a)  $\forall n: \text{nat}. \mathcal{M}_n = n \wedge \mathcal{J}_n = t$
- (b)  $\forall n: \text{nat}. \mathcal{M}_{w+n} = n-t \wedge \mathcal{J}_{w+n} = t-n$
- (c)  $\forall n: \text{nat}. \mathcal{M}_{r+n} = n \wedge \mathcal{J}_{r+n} = t$
- (d)  $\mathcal{M}_w = \mathcal{J}_w = t-1$

After trying the question, scroll down to the solution.

(a)  $\forall n: \text{nat} \cdot \mathcal{M}_n = n \wedge \mathcal{J}_n = t$

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

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

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

(c)  $\forall n: \text{nat} \cdot \mathcal{M}_{r+n} = n \wedge \mathcal{J}_{r+n} = t$

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

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

§ No because the time of this message  $t-1$  is before now  $t$ .