[Recall] A computation by a [multitape] TM \( M \) on an input \( x \in \Sigma^* \) is a sequence of instantaneous descriptions:
\[
I_0 = I_0(x) \overset{1}{\longrightarrow} I_1 \overset{1}{\longrightarrow} I_2 \overset{1}{\longrightarrow} \cdots \overset{1}{\longrightarrow} \overset{1}{I_{t-1}} \overset{1}{\longrightarrow} \overset{1}{I_{t}}
\]
Each \( I_j \) consists of \( \langle \delta, \overline{w}, \overline{h} \rangle \) head positions on all tapes with \( \overline{w} \) on \( \overline{h} \).

Only point we care about is that a computation can be encoded as a single string \( \zeta \).

**Fact:** \( \ell \zeta \leq O(t^2) \) \( \ell \zeta \leq O((n+t)^2) \), where \( n = |x| \), ignorable if \( t \geq n+1 \).

**Def.** The Kleene T-predicate is \( T(M, x, \overline{z}) \) meaning that \( \overline{z} \) is a valid halting computation of \( M \) on input \( x \).

**Fact:** This predicate is decidable — in time \( O(1 + m + n + t^3) \).