

Answer on Question #43232 – Math – Other

For any solvable decision problem, there is a way to encode instances of a problem so that the corresponding language can be recognized by a TM with..... time complexity

- a) linear
- b) exponential
- c) polynomial
- d) none of these

Solution:

We define such an encoding, e , as follows

$$e(x) = \begin{cases} 1x, & \text{if } x \text{ is a yes - instance of the decision problem} \\ 0x, & \text{otherwise} \end{cases}$$

The decision problem is solvable, so e is computable. $e(x)$ can be recognized in a single move by examining the first character of the input. Linear time complexity means there are non-negative constants m, b such that $\tau_T(|x|) \leq mx + b$ where τ_T is the time complexity of the machine solving the decision problem. Clearly that is true for $m = 0$ and $b = 1$.

Answer:

- a) linear.