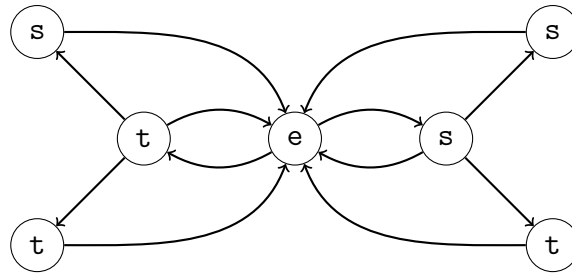# Nondeterministic Processes: Exercises

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Language Modeling   A particular articifial language is restricted to emitting letters according to the following pattern:

   We will assume that the language always starts in one of the four states furthest from the center, printing either an `s` or a `t` as the first symbol. This admits, for instance, strings like `sett` and `tets`, but not `sset`, `ttes`, or `etet`.

1. For $t = 1, 2, 3, 4, 5, 6$, compute $N(t)$.

2. Use the value of $N(6)$ to estimate the entropy rate of this language.

3. How does that rate compare to an unrestricted language over the same alphabet? How "free" is this language, as a percentage of the maximum amount of freedom?

The Echo Process   The echo process consists of strings that consists of binary words of length 4 that are printed twice, as in

$$x \;=\; 1011\,1011\,0010\,0010\,1110\,1110 \ldots$$

Prove that the entropy rate of this process is $H = 1/2$.