400 Define language *lang* by the fixed-point construction axiom

$$lang \; = \; nil, \; \text{“(”}; lang; \text{“)”}, \; lang;lang$$

and associated fixed-point induction axiom.

(a) Informally, what is the language described?

(b) Write an equivalent, nonrecursive definition of the language. Hint: start with § and use a predicate that counts occurrences of characters in a text.

After trying the question, scroll down to the solution.

(a) Informally, what is the language described?

§ The language of matching brackets.

(b) Write an equivalent, nonrecursive definition of the language. Hint: start with § and use a predicate that counts occurrences of characters in a text.

§ Define

$$brackets \; = \; \text{“(”}, \text{“)”}$$
$$strings \; = \; *brackets$$
$$occ \; = \; \langle c: brackets \cdot \langle s: strings \cdot \not\xi\S i: 0,..\leftrightarrow s \cdot s_i{=}c \rangle \rangle$$

Then the language is

$$\S s: strings \cdot \; occ \; \text{“(”} \; s = occ \; \text{“)”} \; s \; \wedge \; \forall i: 0,..\leftrightarrow s \cdot occ \; \text{“(”} \; s_{0;..i} \; \geq \; occ \; \text{“)”} \; s_{0;..i}$$