Seventh exercise sheet for the lecture

Syntax Directed Semantics (Part II)

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Exercise 19
Consider the following wmd program:

$$\begin{aligned} q() &\leftarrow r(x) \\ r(x) &\leftarrow p(y), \text{nextsibling}(y,x), \text{nextsibling}(x,z), s(z) \\ p(x) &\leftarrow \text{firstchild}(y,x) \\ s(x) &\leftarrow \text{lastsibling}(x) \end{aligned}$$

Draw its dependency graph for $\xi = \alpha(\alpha,\alpha,\alpha,\alpha)$. How does the graph change after "inlining" the predicates p and/or s? $\diamond$

Exercise 20
Can "inlining" affect a program's being circular or noncircular? $\diamond$

Exercise 21
Consider the following wmd program:

$$\begin{aligned} q() &\leftarrow p(x) \\ p(x) &\leftarrow r(y), \text{nextsibling}(y,x), 2, \text{lastsibling}(x) \\ p(x) &\leftarrow s(y), t(y), \text{firstchild}(z,x) \\ r(y) &\leftarrow p(x), \text{nextsibling}(x,y), 3 \\ s(y) &\leftarrow p(z), \text{lastsibling}(z), u(y) \\ t(y) &\leftarrow \text{firstchild}(z,y) \\ u(y) &\leftarrow \text{lastsibling}(y) \end{aligned}$$

1. Is it circular?
2. Compute, over the arctical semiring (extended by $+\infty$), $(\llbracket(R,q)\rrbracket, \xi)$ and $(\llbracket(R,q)\rrbracket^{nc}, \xi)$ for some trees ξ.
3. How do things change when replacing the rule $t(y) \leftarrow \text{firstchild}(z,y)$ by $t(y) \leftarrow 1$? $\diamond$