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I know this is a helpful tool, but I think that during the main semester it would be a bit too* helpful and would actually hurt student's learning. Please Please Please respect this policy.

The following information describes inference rules of substitute for lab 3 this summer…. To make my life a little easier I didn't subscript my numbers for most of this… v1 rather than v_1. I hope you can still see what I'm talking about.

Use these to guide your understanding of what substitute is supposed to actually DO for you.

I'm 90% sure these are correct and complete. In an attempt to increase legibility, I've highlighted the `=` in our new op. sem.

First, a few corrections I would make in the lab

$$\text{DoConst}\ \frac{e' = e_2[v_1/x]}{\text{const } x = v_1;\ e_2 \longrightarrow e'}$$

$$\text{DoCall}\ \frac{v_1 = (x) \Rightarrow e_1 \qquad e1' = e_1[v_1/x]}{v_1(v_2) \longrightarrow e1'}$$

$$\text{DoCallRec}\ \frac{v1 = x1(x2) \Rightarrow e1 \qquad e1sub = e1[v2/x2] \qquad e1' = e1sub[v1/x1]}{v1(v2) \longrightarrow e1'}$$

Now for things about substitute… here is one of a few valid solutions:

Grammar:	see page 4 of the lab
Judgment form:	= [/]
~judgmenet form~:	output = input1 [input2 / input3]
Operational semantic:	e_{sub} = e [v / x]
Inference rule name prefix:	Sub

Again… here I won't take the time to subscript sub… see esub as e_{sub}

v1 != p1(x2) => e3

SubValNotFunction----------

v1 = v1 [v/x]

x1 == x2

SubVarSame----------

v = x1[v/x2]

x1!=x2

SubVarDiff----------

x1 = x1[v/x2]

e1sub = e1[v/x]

SubUnary----------

uop e1sub = uop e1 [v / x]

e1sub = e1[v/x] e2sub = e2[v/x]

SubBinary----------

e1sub bop e2sub = e1 bop e2 [v / x]

e1sub = e1[v/x] e2sub = e2[v/x] e3sub = e3[v/x]

SubIf----------

(e1sub) ? e2sub : e3sub = (e1) ? e2 : e3 [v / x]

e1sub = e1[v/x] e2sub = e2[v/x]

SubCall----------

e1sub(e2sub) = e1(e2) [v / x]

e1sub = e1[v/x]

SubPrint----------

console.log(e1sub) = console.log(e1)[v/x]

$$\frac{x1 == x2 \qquad e1sub = e1[v/x2]}{\text{const } x1 = e1sub;\ e2 = \text{const } x1 = e1;\ e2[v/x2]}\ \text{SubConstShadow}$$

$$\frac{x1 != x2 \qquad e1sub = e1[v/x2] \qquad e2sub = e2[v/x2]}{\text{const } x1 = e1sub;\ e2sub = \text{const } x1 = e1;\ e2[v/x2]}\ \text{SubConstNoShadow}$$

$$\frac{x1 == x2}{(x1) \Rightarrow e1 = (x1) \Rightarrow e1[v/x2]}\ \text{SubFunctionShadow}$$

$$\frac{x1 != x2 \qquad e1sub = e1[v/x2]}{(x1) \Rightarrow e1sub = (x1) \Rightarrow e1[v/x2]}\ \text{SubFunctionNoShadow}$$

$$\frac{x1 == x3}{x1(x2) \Rightarrow e1 = x1(x2) \Rightarrow e1[v/x3]}\ \text{SubFunctionRecShadow1}$$

$$\frac{x2 == x3}{x1(x2) \Rightarrow e1 = x1(x2) \Rightarrow e1[v/x3]}\ \text{SubFunctionRecShadow2}$$

$$\frac{x1 != x3 \qquad x2 != x3 \qquad e1sub = e1[v/x3]}{x1(x2) \Rightarrow e1sub = x1(x2) \Rightarrow e1[v/x3]}\ \text{SubFunctionRecShadow1}$$