Compiler
Assignment 6
Attribute Grammars and Top-Down Translator

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1 Question 1

a) S-attributed attribute grammar

Assume `side = 1` means left-hand side, and `side = 0` means right-hand side

production	semantic rules
$S \to L\ R$	
$R \to .\ L$	
$R \to \epsilon$	
$L \to B\ L_s$	
$L_s \to B\ L_{s1}$	
$L_s \to \epsilon$	
$B \to 0$	
$B \to 1$	

b) S-attributed attribute grammar → top-down translator

c) L-attributed attribute grammar

Assume `side = 1` means left-hand side, and `side = 0` means right-hand side

Assume `2^x` in the code means 2 to the power of x

production	semantic rules
$S \to L\ R$	L.side = 1; R.side = 0; S.val = L.val + R.val;
$R \to .\ L$	R.val = L.val
$R \to \epsilon$	R.val = 0;
$L \to B\ L_s$	L.len = 1 + Ls.len; L.val = (L.side == 1) ? B.val * 2^(L.len − 1) + Ls.val : B.val / 2 : Ls.val / 2;}
$L_s \to B\ L_{s1}$	L.len = 1 + Ls.len; L.val = (L.side == 1) ? B.val * 2^(L.len − 1) + Ls.val : B.val / 2 : Ls.val / 2;}
$L_s \to \epsilon$	Ls.len = 0; Ls.val = 0;
$B \to 0$	B.val = 0;
$B \to 1$	B.val = 1;

d) L-attributed attribute grammar → top-down translator