6.7 Consider the following grammar for simple Pascal-style declarations:

decl→ var-list: type var-list→ var-list, id | id type->integer | real

Write an attribute grammar for the type of a variable.

grammar	semantic
decl→ var-list: type	var-list.dtype = type.dtype
var-list₁→ var-list₂,id	id.dtype = var-list₁.dtype
	var-list₂.dtype = var-list₁.dtype
var-list→ id	id.dtype = var-list.dtype
type->integer	type.dtype = integer
type->real	type.dtype = real

6.8 Consider the grammar of Exercise 6.7.Rewrite the grammar so that the type of a variable can be defined as a purely synthesized attribute, and give a new attribute grammar for the type that has this property.

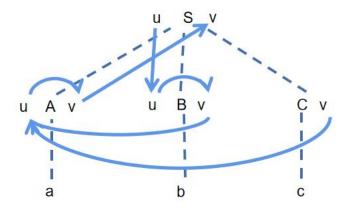
decl→ *id* var-list var-list→ , *id* var-list | : type type->*integer* | *real*

grammar	semantic
decl→ <i>id</i> var-list	<pre>id.dtype = var-list.dtype</pre>
var-list₁→ , id var-list₂	<pre>id.dtype = var-list₂.dtype</pre>
	var-list₁.dtype = var-list₂.dtype
var-list→ : type	var-list.dtype = type.dtype
type-> <i>integer</i>	type.dtype = <i>integer</i>
type-> real	type.dtype = real

6.13 Consider the following attribute grammar:

Grammar Rule	Semantic Rules	
$S \rightarrow ABC$	B.u=S.u	
	A.u=B.v+C.v	
	S.v=A.v	
$A \rightarrow a$	A.v=2*A.u	
$B\rightarrow b$	B.v=B.u	
C→c	C.v=1	

a. Draw the parse tree for the string **abc** (the only string in the language),and draw the dependency graph for the associated attributes. Describe a correct order for the evaluation of the attributes.



order: $C.v \rightarrow S.u \rightarrow B.u \rightarrow B.v \rightarrow A.u \rightarrow A.v \rightarrow S.v$

b. Suppose that S.u is assigned the value 3 before attribute evaluation begins. What is the value of S.v when evaluation has finished?

$$B.u = 3$$

$$B.v = 3$$

$$A.u = 4$$

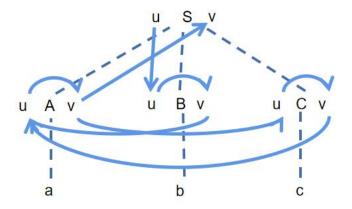
$$8 = v.A$$

$$S.v = 8$$

c. Suppose the attribute equations are modified as follows:

Grammar Rule	Semantic Rules	
	Octification (vales	
$S \rightarrow ABC$	B.u=S.u	
	C.u=A.v	
	A.u = B.v + C.v	
	S.v=A.v	
A→a	A.v=2*A.u	
$B \! o \! b$	B.v=B.u	
C→c	$C.v \rightarrow C.u-2$	

What value does S.v have after attribute evaluation, if S.u = 3 before evaluation begins?



There is no meaningful value since the dependency is cyclic.