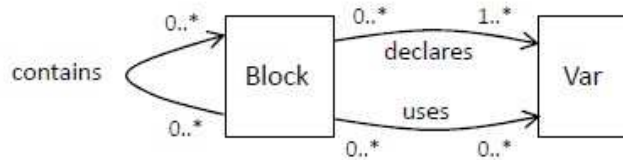
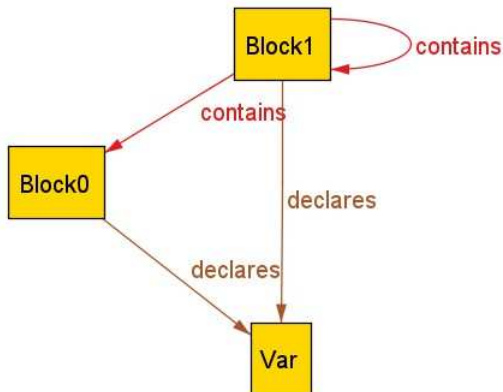


**Question 1.a)**



Full marks also would have received:  
 '\*' instead of '0..\*'  
 '+' instead of '1..\*'

**Question 1.b)**



Other correct answers are possible.

**Question 2**

- a) all  $b:\text{Block}$  |  $b.\text{declare}$  in  $b.\text{uses}$
- b) all  $b:\text{Block}$  | all  $v:b.\text{uses}$  |  $v$  in  $(*\text{contains}.b).\text{declares}$
- b) all  $b:\text{Block}$  |  $b.\text{uses}$  in  $(*\text{contains}.b).\text{declares}$
- c) all  $v:\text{Var}$  | lone  $b:\text{Block}$  |  $v$  in  $b.\text{declares}$
- d) one  $b:\text{Block}$  | all  $b1:\text{Block}$  |  $b1 \neq b \Rightarrow b \text{ !in } b1.\text{contains}$
- d) one  $b:\text{Block}$  | no  $b1:\text{Block}-b$  |  $b$  in  $b1.\text{contains}$

**Question 3**

- a)  $\{b:\text{Block} \mid \text{some } b':b.\text{contains} \mid \text{no } b'.\text{uses}\}$
- b)  $(*\text{contains}.b).\text{declares}$
- c)  $\{b:\text{Block} \mid \text{one } v:\text{Var} \mid \text{all } b':b.\text{contains} \mid b'.\text{uses} = v\}$
- d)  $\{b:\text{Block} \mid \#\{b':b.\text{contains} \mid \text{no } b'.\text{declares}\}=2\}$

**Question 4.a)**

A

**Question 4.b)**

true // because of B2

**Question 4.c)**

true

**Question 4.d)**

$\{A1 \rightarrow A1\}$  // other correct answers:  $\{(A1, A1)\}$  and  $A1 \rightarrow A1$

**Question 4.e)**

false // because of  $A0.r = \{B0, B1, B2\}$

**Question 4.f)**

$\{A1\}$  // other correct answers: A1