

Duration: 20 minutes

Aids Allowed: NONE

Student Number: \_\_\_\_\_

Last (Family) Name: \_\_\_\_\_

First (Given) Name(s): \_\_\_\_\_

Tutorial Room: \_\_\_\_\_ TA's Name: \_\_\_\_\_

This question uses the following database:

Variable	Public	Private
1	No	No
2	Yes	Yes
3	Yes	Yes
4	No	No
5	Yes	No
6	No	Yes

Consider the statement:

(S1) All variables that are not private are not public.

(a) State whether (S1) is true or false. If it is false, then justify your answer by citing a specific counterexample.

False, Variable 5 is a counterexample, because it is not private, but it is public.

(b) Write (S1) in precise symbolic notation.

Let  $V$  = set of all variablesLet  $P(v)$  =  $v$  is publicLet  $R(v)$  =  $v$  is private $\forall v \in V, \neg R(v) \rightarrow \neg P(v)$ 

(c) Write the contrapositive of (S1) in English and in precise symbolic notation.

If a variable is public, then it is private.

Let  $V$  = set of all variablesLet  $P(v)$  =  $v$  is publicLet  $R(v)$  =  $v$  is private $\forall v \in V, P(v) \rightarrow R(v)$