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:

Computer	Network	Administrator
1	Yes	Yes
2	No	No
3	No	Yes
4	Yes	Yes
5	Yes	No
6	No	No

Consider the statement:
(S1) Every computer on a network has an administrator.

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

False, Computer 5 is a counterexample, because it is on a network but it does not have an administrator.

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

Let C = set of all computers
Let N(c) = c is on a network
Let A(c) = c has an administrator
$\forall$ c $\in$ C, N(c) $\rightarrow$ A(c)

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

If a computer does not have an administrator, then it is not on a network.
Let C = set of all computers
Let N(c) = c is on a network
Let A(c) = c has an administrator
$\forall$ c $\in$ C, $\neg$ A(c) $\rightarrow$ $\neg$ N(c)