Worth: 3%   **Due:** By 12 noon on Tuesday 24 January.

1. Students were to write out one of the two provided sentences.

2. (a) False. A counterexample to the universal quantification is computer 5 as it does not have an OS installed.

   (b) True. There is only one computer that has Mac OS X installed (computer 2) and it does not have any other OSs installed.

   (c) False. A counterexample to the universal quantification is computer 6. It has Ubuntu installed but not Windows 7.

3. Let S represent the set of CSC165 students. We will consider this as our domain or universe. Let H represent the set of CSC165 students who do their homework. Let G represent the set of CSC165 students who will get a good mark in the course. Also consider the corresponding predicates: $S(x)$, $H(x)$ and $G(x)$.

   (a) $\forall x \in S, H(x) \Rightarrow G(x)$.

   (b) $\forall x \in H, G(x)$ or $\forall x \in S \cap H, G(x)$

   (c) i. If a CSC165 student did not get a good mark in the course, they did not do their homework.

   ii. $\forall x \in S, \neg G(x) \Rightarrow \neg H(x)$.

   (d) i. If a CSC165 student gets a good mark in the course, they will have done their homework.

   ii. $\forall x \in S, G(x) \Rightarrow H(x)$.

4. Let C represent the set of computers. We will consider this as our domain or universe. Let N represent the set of computers that are on a network. Let I represent the set of computers that have an IP address. Let S represent the set of computers that can share files.

   (a) If a computer is on a network, it has an IP address.

   (b) $\forall x \in C, N(x) \Rightarrow I(x)$ or $\forall x \in N, I(x)$ or $\forall x \in N \cap C, I(x)$. (First form preferred.)

   (c) $\forall x \in C, I(x) \Rightarrow S(x)$ or $\forall x \in I, S(x)$ or $\forall x \in I \cap C, S(x)$. (First form preferred.)

   (d) We can conclude that computer x has an IP address, since otherwise sentence (S2) would be false. We can also conclude that computer x can share files, since otherwise (S3) would be false.

   (e) We can conclude that computer x is not on a network. The contrapositive of (S2) is $\forall x \in C, \neg I(x) \Rightarrow \neg N(x)$. We know that it is equivalent to (S2). We can make our conclusion since if it were not so, the contrapositive of (S2) would be false.