Logic, Information flow and Argumentation

Homework exercises, Week 7, part a (due Friday 23 March).

1. Translations (from the slides for week 7 entitled 'Translations').

   (a) Translate the following sentences from natural language to the language of predicate logic.

        i. If John loves Mary then Mary loves John too.
        ii. John and Mary love each other.
        iii. John and Mary don't love each other.
        iv. Every boy loves Mary.
        v. Not all girls love themselves.
        vi. No boy or girl loves Peter.
        vii. Peter loves some girl who loves John.
        viii. No PC is a real computer.
        ix. If something is a PC then its not a real computer.
        x. Every apple is either green or yellow.
        xi. There is an apple that is neither green nor yellow.
        xii. No apple is blue.
        xiii. Every man likes every tasty apple.
        xiv. Everybody is walking and talking.
        xv. Somebody is sleeping but somebody is not sleeping.
        xvi. All animals are mortal.
        xvii. If some student is bothering Mary, she gets annoyed.
        xviii. Everyone who talks will be sent out.
        xix. If John is right, somebody took his pen.
        xx. If someone is rich, everyone is jealous.
        xxi. Everyone who is a doctor should come forward, the rest should remain seated.
        xxii. Every human is male or female, but there is an animal that is neither male nor female.

(b) For each one of the sentences you translated sketch a situation that makes the sentence true and one that makes the sentence false.

(c) i. Write the sentence *"Some presidents were great"* in the language of predicate logic.

ii. Write the sentence *"Some presidents were not great"* in the language of predicate logic.

iii. Assume S stands for *"smarter than"*. What do the following formulas say in natural language?

A. $\neg\exists x(Sxx)$

B. $\forall x\exists y(Syx)$

C. $\forall x\neg\exists y(Sxy)$

iv. Write a formula that expresses *"There is no smartest person"*.