Solution 1

(a) $\exists x \in X$ such that $S(x) \wedge A(x)$ is true.

(b) $\forall x \in X, T(x) \wedge S(x) \implies A(x)$

(c) $\nexists x \in X$ such that $(T(x) \wedge S(x)) \wedge \neg A(x)$

(d) $S = \{\forall x \in X : T(x) \wedge \neg S(x)\}$. Then, $|S| \geq 3$

Solution 2

TODO: It's easy enough. So, I'll skip it for later.

Solution 3

(a) (i) $\neg(A \text{ nand } B)$

(ii) $(A \text{ nand } A) \text{ nand } (B \text{ nand } B)$

(iii) $(\neg A \text{ nand } \neg A) \text{ nand } (B \text{ nand } B)$

(b) $\neg A = A$ nand A.

(c) true is A nand (A nand A). Similarly, false is (A nand (A nand A)) nand (A nand (A nand A))