Predicate Logic (Exercise)

Translate the following sentences into predicate logic (1 - 10)

$I(x)$ $E(x)$ $O(x)$.

1) Some integers are even and some integers are odd.

$\exists x \, (Ix \wedge Ex) \wedge (Ix \wedge Ox)$.

2) All integers are even

$\forall x \; Ix \rightarrow Ex$.

3) If an integer is not even, then it is odd.

$\forall x \; Ix \rightarrow (\neg Ex \rightarrow Ox)$.

4) Some integers are odd.

$\exists x \; Ix \wedge Ox$.

5) A number is even only if it is integer.

$\forall x \; Ex \rightarrow Ix$.

6) All sins is a form of lying

$\forall x \; Sx \rightarrow Lx$.

7) Jeff is happy.

Hj

8) Tom and Jerry are both dogs.

$D_T \wedge D_J$

9) Jack is happier than Tim, but sadder than Bob.

$H(j,t) \wedge S(j,b)$.

10) Paul is a trouble maker when Ben dislikes him.

$T_p \wedge D(b,p)$.

12) Prove $\rightarrow \forall x \, P(x) \equiv \exists x \rightarrow P(x)$

13) Prove $\forall x (P(x) \vee Q(x)) \not\equiv \forall x \, P(x) \vee \forall x \, Q(x)$

Giving counter example.

14) Prove $\exists x (P(x) \wedge Q(x)) \not\equiv (\exists x \, P(x) \wedge \exists x \, Q(x))$

$\neg \forall x P(x)$. 13)

$= \exists x$