112-1 Discrete Mathematics Charpter 1-4

姓名：許嘉隆　　學號：412770116

4.

a) $P(x)$ *is False, and* $x = 0$ (x *has no change*)

b) $P(x)$ *is False, and* $x = 1$ (x *has no change*)

c) $P(x)$ *is True, and* $x = 1$ (x *changes*)

6.

b) "*Every students in school have visited North Dakota.*"

d) "*Some students in school have not visited North Dakota.*"

f) "*Every students in school have not visited North Dakota.*"

10.

a) $\exists x\,(C(x) \wedge D(x) \wedge F(x))$

c) $\exists x\,(C(x) \wedge F(x) \wedge \neg D(x))$

e) $\exists x\,C(x) \wedge \exists x\,D(x) \wedge \exists x\,F(x)$

14.

a) T

b) T

c) T

d) F, *because if* $x < 0$, *then* $2x < x$

30.

a) $P(1,3) \vee P(2,3) \vee P(3,3)$

b) $P(1,1) \wedge P(1,2) \wedge P(1,3)$

c) $\neg(P(2,1) \wedge P(2,2) \wedge P(2,3))$

d) $\neg(P(1,2) \vee P(2,2) \vee P(3,2))$

36.

a) $\exists x\,((x \leqslant -2) \vee (x \geqslant 3))$

b) $\exists x\,((x < 0) \vee (x \geqslant 5))$

c) $\forall x\,((x < -4) \vee (x > 1))$

d) $\forall x\,((x \leqslant -5) \vee (x \geqslant -1))$

62.

a) $\forall x\,\big(P(x) \to Q(x)\big)$

b) $\exists x\,(R(x) \wedge \neg Q(x))$

c) $\exists x\,(R(x) \wedge \neg P(x))$

d) *Yes.*

Let $p = P(x)$, $q = Q(x)$. (*a*) *can be simplified as the proposition* $p \to q$.

Based on $p \to q \equiv \neg q \to \neg p$, (*b*) *and* (*c*) *can be expressed as the proposition* $\neg q \to \neg p$ (*don't care* $R(x)$).

So it's a logical equivalence and they do not conflict with each other.