week02 tutorial

Q1

Use quantifiers to express the statement that “There is a woman who has taken a flight on every airline in the world.

P(x) = a women

Q(x) = who has taken a flight on every airline in the world

$$\exists x \exists y \forall z (P(x,y) \wedge Q(y,z))$$

Q2

$$1. Q(0,0,0) \wedge Q(0,1,0)$$
$$2. Q(0,1,1) \vee Q(1,1,1) \vee Q(2,1,1)$$
$$3. Q(1,0,0) \vee Q(1,0,1) \vee (1,1,0) \vee Q(1,1,1) \vee$$
$$Q(2,0,0) \vee Q(2,0,1) \vee Q(2,1,0) \vee Q(2,1,1)$$
$$4. more...$$

Q3

$$\forall x (P(x) \wedge Q(X))$$
$$= P(x)$$
$$= R(x)$$

$$\forall x (Q(x) \wedge S(x))$$
$$= S(x)$$

$$\forall x (R(x) \wedge S(x))$$
$$Q.E.D.$$

Q4

$$\exists x \neg P(x)$$
$$= \neg \forall x P(x)$$
$$= \forall x Q(x)\ Q(a)$$
$$= \forall x S(x)\ S(a)$$

$$\forall x (R(x) \rightarrow \neg S(x))$$
$$S(c) \rightarrow \neg R(c)$$
$$= \exists x \neg R(x)$$

Q5

$$p \vee q$$
$$\neg p \vee q$$
$$p \vee \neg q$$
$$\neg p \vee \neg q$$
$$q$$
$$\neg q$$
$$Q.E.D$$