

$$\#4b \quad (\forall x)(\forall y) [P(x,y) \rightarrow P(y,x)]$$

domain: integers

$$P(x,y) : x = y$$

True in that context

Change P to $x > y$,

it is false.

$$4d. (\exists x) [A(x) \wedge (\forall y) B(x, y)]$$

$$5c. (\exists x) [(\forall y) P(x, y) \wedge Q(x, y)]$$

11a. All buses love all flowers

$$(\forall x) [B(x) \rightarrow (\forall y) [F(y) \rightarrow L(x,y)]]$$

$$(\forall x)(\forall y) [B(x) \wedge F(y) \rightarrow L(x,y)]$$

11b. Some bees love all flowers.

$$\underline{(\exists x)(\forall y) [B(x) \wedge F(y) \rightarrow L(x, y)]}$$

$$(\exists x) [B(x) \wedge (\forall y) [F(y) \rightarrow L(x, y)]]$$

14c (All people) are (tall and thin)'
Negation: ↓ ↓
(Someone) is short or fat.

d. (Some pictures) are (old or faded)'
Negation ↓ ↓
(Every picture) not old and not faded

$$18d. A(a) \rightarrow (\exists x)A(x)$$

If a has property A , then
certainly someone in the domain
has property A !

$$e. (\forall x)(A(x) \rightarrow B(x)) \rightarrow [(\forall x)A(x) \rightarrow (\forall x)B(x)]$$

3b

$$(\forall x)(\forall y)(\forall z) [Q(x,y) \wedge Q(y,z) \rightarrow Q(x,z)]$$