Practice 03

problem 1 *Symbolizing*

For each of the following, convert from text to symbolic logic. Some are known, named truths (we included the name for fun); others are false. The first one is done for you.

Celarent No G are F. All H are G. So: No H are F

$\nexists x \,.\, G(x) \wedge F(x)$ *or* $\forall x \,.\, G(x) \rightarrow \neg F(x)$*, or* $\forall x \,.\, \neg\big(G(x) \wedge F(x)\big)$*, or equivalent*

$\forall x \,.\, H(x) \rightarrow G(x)$ *or equivalent*

$\therefore\ \nexists x \,.\, H(x) \wedge F(x)$ *or equivalent*

Barbara All G are F. All H are G. So: All H are F

$\forall x \,.\, G(x) \rightarrow F(x)$

$\forall x \,.\, H(x) \rightarrow G(x)$

$\therefore\ \forall x \,.\, H(x) \rightarrow F(x)$

Ferio No G are F. Some H is G. So: Some H is not F

$\nexists x \,.\, G(x) \wedge F(x)$

$\exists x \,.\, H(x) \wedge G(x)$

$\therefore\ \exists x \,.\, H(x) \wedge \neg F(x)$

(false) All G are F. No H is not G. So: Some H is not F

$\forall x \,.\, G(x) \rightarrow F(x)$

$\nexists x \,.\, H(x) \wedge \neg G(x)$

$\therefore\ \exists x \,.\, H(x) \wedge \neg F(x)$

Want more practice? Try Practice exercises $\forall x$ 22.A (pages 187–188)

PROBLEM 2 *Symbolizing with a Key*

Using this symbolization key:

domain: all animals

$A(x)$: $\underline{\quad}_x$ is an alligator

$M(x)$: $\underline{\quad}_x$ is a monkey

$Z(x)$: $\underline{\quad}_x$ lives at the zoo

$L(x, y)$: $\underline{\quad}_x$ loves $\underline{\quad}_y$

a: Artist

b: Bouncer

c: Champion

Symbolize each of the following sentences; the first one is done for you.

If both Bouncer and Champion are alligators, then Artist loves them both.

$$\big(A(b) \land A(c)\big) \rightarrow \big(L(a, b) \land L(a, c)\big)$$

Any animal that lives at the zoo is either a monkey or an alligator.

$$\forall x \,.\, Z(x) \rightarrow \big(M(x) \lor A(x)\big)$$

Champion loves a monkey.

$$\exists x \,.\, M(x) \land L(c, x)$$

All the monkeys that Artist loves love Artist.

$$\forall x \,.\, \big(L(a, x) \land M(x)\big) \rightarrow L(x, a)$$

Everyone Bouncer loves loves some animal other than Bouncer.

$$\forall x \,.\, L(b, x) \rightarrow \big(\exists y \,.\, (y \neq b) \land L(x, y)\big)$$

Every animal in the zoo's love is outside the zoo, and vice versa.

$$\forall x, y \,.\, L(x, y) \rightarrow \big(Z(x) \oplus Z(y)\big)$$

Want more practice? Try Practice exercises $\forall x$ 22.B (page 188) and $\forall x$ 23.A–F (pages 199–203).