


Solutions to Workbook Exercises

Unit 15:

Quantifiers and Negation











Existentialization of a negation:

- [2] $\exists x \sim Bx$
{2} There is an x such that x is not beautiful.
(2) Somebody is not beautiful.

Universalization of a negation:

- [4] $\forall x \sim Bx$
{4} For every x , x is not beautiful.
[Everybody is not beautiful.]
(4) Nobody is beautiful.

Exercise “Canonical Reading”

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|-----|----------------|-------------------------------|
| (1) | U.D.: people | Px : x is wise |
| (2) | U.D.: people | Px : x is happy |
| (3) | U.D.: dogs | Px : x barks |
| (4) | U.D.: husbands | Px : x cheats on his wife |
| (5) | U.D.: things | Px : x is round |

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|-----|---------------------|-----|---|
| (a) | $\exists x \sim Px$ | (1) | There is an x , such that x is not wise.
Someone is not wise. |
| | | (2) | There is an x , such that x is not happy.
Someone is not happy. |
| | | (3) | There is an x , such that x does not bark.
Some dogs do not bark. |
| | | (4) | There is an x , such that x does not cheat on his wife.
Some husbands do not cheat on their wives. |
| | | (5) | There is an x , such that x is not round.
Something is not round. |
| (b) | $\sim \exists x Px$ | (1) | There is no x , such that x is wise.
Nobody is wise. |
| | | (2) | There is no x , such that x is happy.
Nobody is happy. |
| | | (3) | There is no x , such that x barks.
No dogs bark. |
| | | (4) | There is no x , such that x cheats on his wife.
No husband cheats on his wife. |
| | | (5) | There is no x , such that x is round.
Nothing is round. |

- (1) U.D.: people Px : x is wise
- (2) U.D.: people Px : x is happy
- (3) U.D.: dogs Px : x barks
- (4) U.D.: husbands Px : x cheats on his wife
- (5) U.D.: things Px : x is round

(c) $\sim\forall x Px$

- (1) Not: For every x , x is wise.
Not everybody is wise.
- (2) Not: For every x , x is happy.
Not everybody is happy.
- (3) Not: For every x , x barks.
Not every dog barks.
- (4) Not: For every x , x cheats on his wife.
Not every husband cheats on his wife.
- (5) Not: For every x , x is round.
Not everything is round.

(d) $\forall x \sim Px$

- (1) For every x , x is not wise.
Nobody is wise.
- (2) For every x , x is not happy.
Nobody is happy.
- (3) For every x , x does not bark.
No dogs bark.
- (4) For every x , x does not cheat on his wife.
No husband cheats on his wife.
- (5) For every x , x is not round.
Nothing is round.

Exercise “Negated Quantifiers”

Symbolize the following propositions in two equivalent ways:

U.D.: people

Hx : x is honest

Tx : x is trustworthy

(a) Not everybody is honest.

$\sim\forall x Hx$

$\exists x \sim Hx$

(b) Nobody is honest.

$\sim\exists x Hx$

$\forall x \sim Hx$

(c) Somebody is dishonest.

$\exists x \sim Hx$

$\sim\forall x Hx$

(d) Everybody is dishonest.

$\forall x \sim Hx$

$\sim\exists x Hx$

(e) Not everybody is trustworthy.

$\sim\forall x Tx$

$\exists x \sim Tx$

(f) Nobody is trustworthy.

$\sim\exists x Tx$

$\forall x \sim Tx$

(g) Somebody is untrustworthy.

$\exists x \sim Tx$

$\sim\forall x Tx$

(h) Everybody is untrustworthy.

$\forall x \sim Tx$

$\sim\exists x Tx$

(i) Not everybody is untrustworthy.

$\sim\forall x \sim Tx$

$\exists x \sim\sim Tx$

(j) Somebody is not dishonest.

$\exists x \sim\sim Hx$

$\sim\forall x \sim Hx$