

## Workbook Unit 20: Logic of Relations – Exercises

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### Ex. Singular Propositions I.

Symbolize the following statements in terms of the following symbolization key:

U.D.: people

*a*: Annie

*Txy*: *x* is taller than *y*

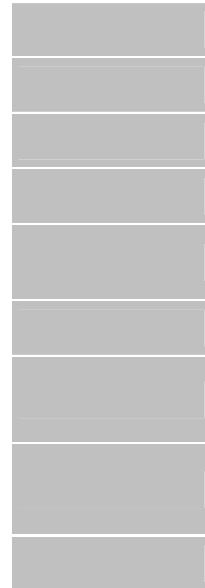
*b*: Betty

*Sxy*: *x* is shorter than *y*

*c*: Charlie

*d*: Debbie

- (a) Annie is shorter than Betty.
- (b) Betty is shorter than Charlie.
- (c) Debbie is taller than Charlie.
- (d) Charlie is shorter than Debbie.
- (e) Betty is shorter than Charlie, but Debbie is not shorter than Charlie.
- (f) Annie, Betty and Charlie are shorter than Debbie.
- (g) If Annie is shorter than Betty and Betty is shorter than Debbie, then Annie is shorter than Debbie.
- (h) Either Charlie is shorter than Debbie or Debbie is shorter than Charlie.
- (i) Charlie is not taller than Debbie, nor is he shorter than Betty.



**Ex. Symbolizations.I.**

Symbolize the following propositions:

U.D.: people

*b*: Bill Clinton

*g*: George W. Bush

*h*: Hillary Clinton

*Wxy*: *x* is wiser than *y*

*Pxy*: *x* is more popular than *y*

*Dxy*: *x* deceives *y*

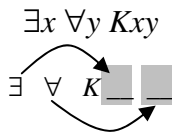
- (a) Bill Clinton is more popular than George W. Bush.
- (b) Hillary Clinton is the most popular person.
- (c) Everybody is more popular than George W. Bush.
- (d) There is a person who is more popular than anybody.
- (e) Someone is wiser than somebody.
- (f) Everybody is wiser than someone.
- (g) There is a person who is wiser than anybody.
- (h) Somebody deceives someone.
- (i) Somebody is deceived by someone.
- (j) Everybody is deceived by someone.
- (k) There is a person who is deceived by everybody.
- (l) There is a person who deceives everybody.
- (m) Everybody deceives someone.

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**Ex. Variables-are-Not-Names.I.**

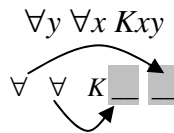
Complete the alternative representations of the following statements:

(a)



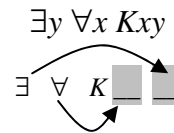
|                       |  |
|-----------------------|--|
| $\exists y \forall x$ |  |
| $\exists z \forall x$ |  |
| $\exists x \forall z$ |  |
| $\exists z \forall y$ |  |
| $\exists y \forall z$ |  |

(b)



|                       |       |
|-----------------------|-------|
|                       | $Kyx$ |
|                       | $Kxz$ |
| $\forall x \forall z$ |       |
| $\forall z \forall y$ |       |
|                       | $Kzy$ |

(c)



|                       |       |
|-----------------------|-------|
| $\exists x \forall y$ |       |
| $\exists z \forall x$ |       |
|                       | $Kzx$ |
|                       | $Kzy$ |
| $\exists z \forall y$ |       |

**Ex. Symbolizations.II.**

U.D.: people     $Wx$ :  $x$  is a woman     $Mx$ :  $x$  is a man     $Lxy$ :  $x$  loves  $y$

- (a) All women love somebody.
- (b) There is a man who loves everyone.
- (c) There is a man who loves every woman.
- (d) All women love some man.
- (e) All men love some woman.
- (f) Some men are loved by everyone.
- (g) Some women are loved by some men.
- (h) All men love themselves.
- (i) Every man is loved by some woman.
- (j) There is a woman who loves every man.
- (k) There is no woman who loves every man.
- (l) Not every man loves some woman.
- (m) Only men love themselves.
- (n) Not all women love themselves
- (o) No man is loved by all women.
- (p) Not only men love themselves.



**Ex. Symbolizations.III.**

U.D.: people     $Mx$ :  $x$  is a man     $Wx$ :  $x$  is a woman     $Dxy$ :  $x$  deceive  $y$   
 $Px$ :  $x$  is a politician     $Rx$ :  $x$  is rich     $Sxy$ :  $x$  steals from  $y$

- (a) All politicians deceive someone.
- (b) Someone is deceived by all politicians.
- (c) No woman politician is rich.
- (d) All man politicians are rich.
- (e) Every rich politician steals from someone.
- (f) Every rich politician steals from someone who is not rich.
- (g) Every woman politician is deceived by some man politician.
- (h) Only men are rich.
- (i) Only those who steal from someone are rich.
- (j) Every politician who deceives someone is deceived by someone.
- (k) There is a person who steals from someone and deceives everyone.
- (l) Not everybody who deceives someone is deceived by everybody.
- (m) Only men deceive themselves.

