

Exercise No. 01:

Consider the following formulas:

1. $\exists x P(x, \text{Zéro})$
2. $\forall x P(x, x)$
3. $\forall x \exists y P(x, y)$
4. $\exists x \forall y P(x, y)$
5. $\exists y \forall x P(x, y)$
6. $\forall y \exists x P(x, y)$
7. $\exists x \forall y \neg E(y, x) \Rightarrow P(x, y)$
8. $\forall x (P(x, y) \wedge \neg P(x, y))$

State whether the above formulas are true or false for the following interpretation:

$D = \mathbb{N}$, $P(x, y) = "x > y"$, $E(x, y) = "x = y"$, $\text{Zero} = 0$

Exercise No. 02:

Convert the following formulas into Prenex and Skolem forms.

1. $(\forall x P(x)) \Rightarrow Q(y)$
2. $(\exists x (\neg F(x) \vee G(x))) \wedge (\exists x F(x) \wedge \forall x \neg G(x))$
3. $\forall x P(x) \wedge \exists y Q(y) \Rightarrow \exists y (P(y) \wedge Q(y))$
4. $\forall x [(\forall y P(x) \vee \forall z Q(z, y)) \Rightarrow \neg \forall y R(x, y)]$