

课后作业 3.1 (Assignments)

一、阅读 (Reading)

1. 阅读教材.
2. 课外阅读:



Predicate Logic (1) -by Gerard O' Regan.pdf.pdf

二、问题解答 (Problems)

1. 教材 P51: 题 1 (1, 3, 5, 7)
2. 教材 P51: 题 5;
3. 教材 P52: 题 7;
4. 教材 P52: 题 10;
5. 教材 P52: 题 11 (1, 3, 5) ;
6. 教材 P52: 题 12 (1, 3, 5) ;
7. Given the wff $W = \exists x p(x) \rightarrow \forall x p(x)$.
 - a. Find all possible interpretations of W over the domain $D = \{a\}$. Also give the truth value of W over each of the interpretations.
 - b. Find all possible interpretations of W over the domain $D = \{a, b\}$. Also give the truth value of W over each of the interpretations.
8. Find a model for each of the following wffs.
 - a. $p(c) \wedge \exists x \neg p(x)$.
 - b. $\exists x p(x) \rightarrow \forall x p(x)$.
 - c. $\exists y \forall x p(x, y) \rightarrow \forall x \exists y p(x, y)$.

d. $\forall x \exists y p(x, y) \rightarrow \exists y \forall x p(x, y)$.

e. $\forall x (p(x, f(x)) \rightarrow p(x, y))$.

9. Given the wff $W = \forall x p(x, x) \rightarrow \forall x \forall y \forall z (p(x, y) \vee p(x, z) \vee p(y, z))$.

a. Show that W is true for any interpretation whose domain is a singleton.

b. Show that W is true for any interpretation whose domain has two elements.

c. Show that W is not valid.

d. Find an example of a wff that is true for any interpretation that has a domain with three or fewer elements but is not valid.

10. Prove that each of the following wffs is valid, unsatisfiable, or invalid.

a. $\forall x (p(x) \rightarrow p(x))$.

b. $\exists x (p(x) \wedge \neg p(x))$.

c. $\exists x \forall y (p(x, y) \wedge \neg p(x, y))$.

d. $\forall x A(x) \vee \forall x B(x) \rightarrow \forall x (A(x) \vee B(x))$.

e. $\forall x (A(x) \rightarrow B(x)) \rightarrow (\forall x A(x) \rightarrow \exists x B(x))$.

三、项目实践 (Programming) (Optional)

无.