

### 离散数学(1) Discrete Mathematics

#### 几个证明过程

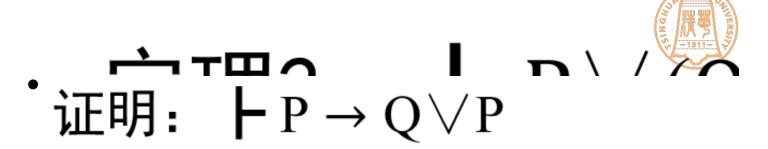
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#### →Ⅲ4

$$(1) \vdash (Q \to R) \to (P \to Q) \to$$

(2) 
$$\vdash ((P \lor Q) \rightarrow (Q \lor P)) \rightarrow ((Q \lor P)) \rightarrow$$



$$(1) \quad [P R \to P] \lor R$$

$$(2) \rightleftharpoons Q \lor R \rightarrow Q \lor (P \lor R)$$

(3) 
$$\vdash P \lor (Q \lor R) \to P \lor (Q \lor (P \lor Q))$$

(4) 
$$\vdash (P \lor O) \rightarrow (O \lor P)$$

#### 定理2(接上页)



(8) 
$$\vdash (P \lor (Q \lor R) \to P \lor (Q \lor P) \to (P \lor (Q \lor R) \to (Q \lor P) \to (P \lor Q) \to (Q \lor P) \to (Q \lor P)$$

#### 定理2(接上页)



证明:

$$(15) \vdash Q \lor (P \lor R) \lor P \to (Q \lor Q)$$

 $(16) \vdash P \to P \lor P$ 

(17) 
$$\vdash$$
 (Q $\lor$ (P $\lor$ R)) $\lor$ (Q $\lor$ (P $\lor$ 



- $(1) \vdash R \lor Q \to Q \lor R$
- $(2) \vdash (A \rightarrow B) \rightarrow ((C \lor A) \rightarrow (A))$
- (3)  $\vdash$  ((R  $\lor$  Q)  $\rightarrow$  (Q  $\lor$  R))  $\rightarrow$  ((



- $(1) \vdash P \lor (Q \lor R) \to Q \lor (P \lor R)$
- (2)  $\vdash P \lor (R \lor Q) \rightarrow P \lor (Q \lor R)$
- (3)  $\vdash (P \lor (R \lor Q) \rightarrow P \lor (Q \lor Q))$



(1) 
$$\vdash (Q \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow$$

$$(2) \vdash \underline{\neg}(Q \to R) \lor (\neg(P \to Q) \lor$$

$$(3) \vdash P \lor (Q \lor R) \to (P \lor Q) \lor (3)$$

$$(4) \vdash \neg (Q \to R) \nabla (\neg (P \to Q) \vee$$



#### ╧┲╓

- $(1) \vdash P \rightarrow \neg \neg P$
- (2)  $\vdash Q \lor P \rightarrow Q \lor \neg \neg P$
- (3)  $\vdash P \lor Q \rightarrow Q \lor P$
- (1)  $\mathbf{L}$  DV()  $\rightarrow$   $\Omega$ ()  $\mathbf{L}$  D

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(1) 
$$\vdash (Q \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow$$

(2) 
$$\vdash \neg (Q \rightarrow R) \lor (\neg (P \rightarrow Q) \lor Q) \lor (Q \rightarrow Q) \lor Q$$

$$(3) \vdash P \lor (Q \lor R) \to (P \lor Q) \lor I$$

(4) 
$$\vdash \neg (Q \rightarrow R) \lor (\neg (P \rightarrow Q) \lor$$

# 一个更加简便的用三段论的方法

 $(1) \vdash (Q \to R) \to (P \to Q)$ 

 $(2) \vdash (Q \rightarrow R)$ 

(3)  $\vdash$  (P  $\rightarrow$  Q)  $\rightarrow$  (P  $\rightarrow$  R)

## 选做题:求更简单的三段论推导方法

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