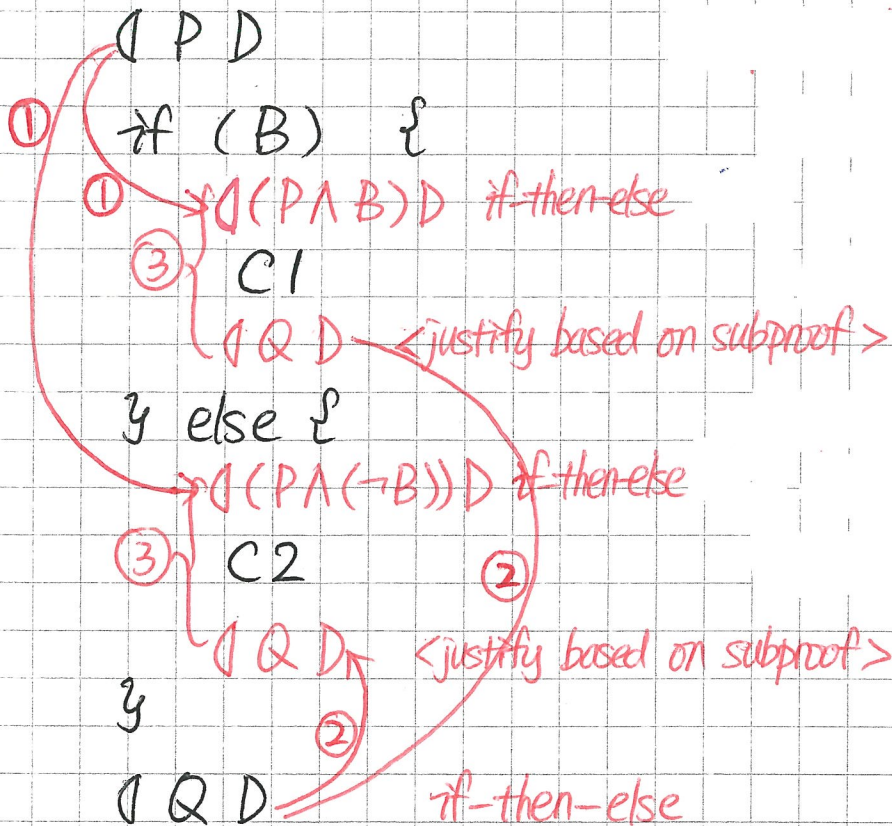


The if-then-else inference rule.



Complete the annotations for the 2 subproofs

$(P \wedge B) \ D$

$C1$

$(Q \ D)$

$(P \wedge (\neg B)) \ D$

$C2$

$(Q \ D)$

Example of "if-then-else"

$\{ \text{true} \}$

if $(x > y)$ { (alternatively, $\{ (x > y) \}$)

$\{ \text{true} \wedge (x > y) \}$

if-then-else

$\{ ((x > y) \wedge (x = x)) \vee ((x \leq y) \wedge (x = y)) \}$ implied (A)

max = x;

$\{ ((x > y) \wedge (\text{max} = x)) \vee ((x \leq y) \wedge (\text{max} = y)) \}$ assignment

} else {

$\{ \text{true} \wedge (\neg(x > y)) \}$ (alternatively, $\{ (\neg(x > y)) \}$)

if-then-else

$\{ ((x > y) \wedge (y = x)) \vee ((x \leq y) \wedge (y = y)) \}$ implied (B)

max = y;

$\{ ((x > y) \wedge (\text{max} = x)) \vee ((x \leq y) \wedge (\text{max} = y)) \}$ assignment

}

$\{ ((x > y) \wedge (\text{max} = x)) \vee ((x \leq y) \wedge (\text{max} = y)) \}$ if-then-else

Proof of implied (A)

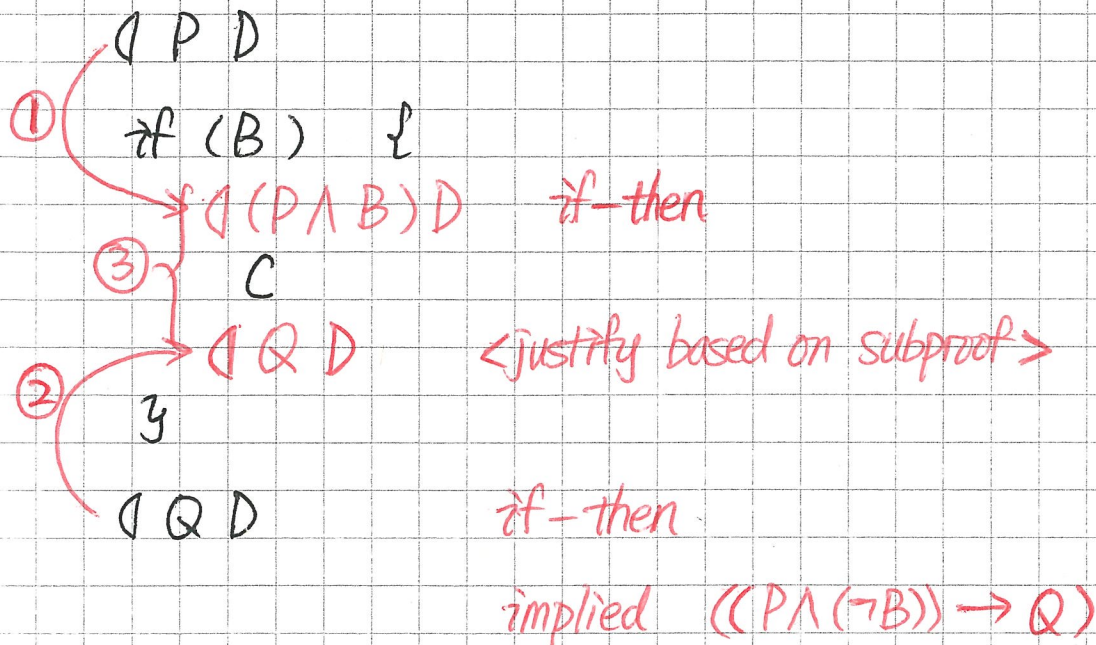
Assume $(x > y)$ is true.

$(x = x)$ is true by def. of =. By def. of \wedge , $(x > y) \wedge (x = x)$ is true. By def. of \vee , $((x > y) \wedge (x = x)) \vee ((x \leq y) \wedge (x = y))$ is true.

Steps to follow:

- ① Annotate the program.
- ② Prove any implied's.

The if-then inference rule



Complete the annotations for the subproof.

$\{ \begin{array}{l} P \wedge B \\ \vdots \\ Q \end{array} \}$

C

$\{ \begin{array}{l} P \\ \vdots \\ Q \end{array} \}$

Example of "if-then".

$\{ \text{true} \}$

$\{ \text{if } (\text{max} < x) \}$

$\{ (\text{max} < x) \}$

if-then

$\{ (x \geq x) \}$

implied (a)

$\text{max} = x;$

$\{ (\text{max} \geq x) \}$

assignment

$\}$

$\{ (\text{max} \geq x) \}$

if-then

implied (b): $((\neg(\text{max} < x)) \rightarrow (\text{max} \geq x))$

Proof of implied (a):

Assume $(\text{max} < x)$ is true. $(x \geq x)$ is true by def. of \geq .

Proof of implied (b):

Assume $(\neg(\text{max} < x))$. By def of \neg , we have that $(\text{max} \geq x)$