

DIRECT PROOF STRUCTURE REFERENCE
CSC236 — 2024 FALL

Recall that when proving a statement that has all negation “pushed inside” there’s a “direct” proof structure that follows the recursive logical structure of the statement.

WTP p where p is of the form:

- $\forall x \in D, P(x)$: Let $x \in D$. [WTP $P(x)$].
- $\exists x \in D, P(x)$: Let $x = ______$, which is in D since $______$. [WTP $P(x)$].
- $q \Rightarrow r$: Assume q . [WTP r].
- $q \Leftrightarrow r$: [WTP $q \Rightarrow r$]. [WTP $r \Rightarrow q$].
- $q \wedge r$: [WTP q]. [WTP r].
- $q \vee r$: Case $______$ [WTP q]. Otherwise [WTP r].

Assume/Case/witnessing p where p is of the form:

- $\forall x \in D, P(x)$: leave it alone, we’ll likely instantiate it to assume $P(x)$ later for one or more particular $x(s)$ we’ll show are in D .
- $q \Rightarrow r$: leave it alone, we’ll likely prove q later, or assume it in a case, so that we can assume r .
- $\exists x \in D, P(x)$: Assume $x \in D$ witnesses the existential, so $P(x)$.
- $q \wedge r$: Assume q . Assume r .
- $q \vee r$ [when WTP s] : Case q [WTP s]. Case r [WTP s].

When introducing a variable (proving universal or existential, or assuming existential) rename it if it clashes with other introduced variables.

Although the variable in a universal assumption is in its own scope you might want to rename it during the assumption before you think about which values you want to instantiate it with.