

E.S "Direct" proof:

Since x^* solves $\max_{x \in X} f(x)$, we know

$$f(x^*) \geq f(x) \text{ for all } x \in X.$$

Since $Y \subseteq X$, this implies

$$f(x^*) \geq f(y) \text{ for all } y \in Y.$$

could write x

So x^* solves $\max_{y \in Y} f(y)$. \square

E.5 "structured" proof:

x^* solves $\max_{x \in X} f(x)$

$\Leftrightarrow f(x^*) \geq f(x)$ for all $x \in X$
"if and only if"

$\Rightarrow f(x^*) \geq f(y)$ for all $y \in Y$
"implies" (since $Y \subseteq X$)

~~\Rightarrow~~ x^* solves $\max_{y \in Y} f(y)$. \square
(since $x^* \in Y$)
"it has been shown"

QED

E.5 Proof by contradiction:

Suppose for the sake of contradiction that x^* does NOT solve

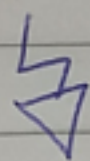
$$\max_{y \in Y} f(y).$$

Since Y is finite, there is some other solution $y^* \in Y$ with $y^* \neq x^*$.

Since $x^* \in Y$ and x^* is not a solution, it follows that $f(y^*) > f(x^*)$.

But this contradicts x^* solving

$$\max_{x \in X} f(x)$$



← we found a contradiction