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LAGRANGE MULTIPLIER THEOREM

$A \subseteq \mathbb{R}^n$, $n \geq 2$ open $F: A \subseteq \mathbb{R}^n \longrightarrow \mathbb{R}$

CONSIDER $x^0 \in A$; $C_1 = \{F = F(x^0)\}$

CONSIDER A FUNCTION $f: A \subseteq \mathbb{R}^n \longrightarrow \mathbb{R}$

ASSUME

- F IS C^1
- $\nabla F(x^0) \neq 0$
- f IS DIFFERENTIABLE IN x^0

IF x^0 IS A LOCAL EXTREMUM POINT FOR f WITH RESPECT TO THE SET C_1, THEN THERE EXISTS $\lambda \in \mathbb{R}$ (LAGRANGE MULTIPLIER) SUCH THAT $\boxed{\nabla f(x^0) = \lambda \nabla F(x^0)}$