Extremal points are roots of $\nabla F(x)$ $\leftarrow \underline{f}(x)=0$

- Newton's method: $\underline{x}^{(n+1)} = \underline{x}^{(n)} - J^{-1}\,\underline{f}(\underline{x}^{(n)})$ $\quad J = \nabla \underline{f}$

Here: $\boxed{\underline{x}^{(n+1)} = \underline{x}^{(n)} - H^{-1}\,\nabla F(\underline{x}^{(n)})}$ $\quad = \nabla\nabla F = H$ (Hessian)

↳ GAUSSIAN ELIMINATION

Shorthand for

$\rightarrow \underbrace{H}_{A}\underbrace{(\underline{x}^{(n+1)} - \underline{x}^{(n)})}_{x} = \underbrace{-\nabla F(\underline{x}^{(n)})}_{b}$

$Ax=b$

GE to get x

$x = A^{-1}b$

- Gradient descent: $\boxed{\underline{x}^{(n+1)} = \underline{x}^{(n)} - \alpha\,\nabla F(\underline{x}^{(n)})}$

step size $\alpha > 0$

"line search"