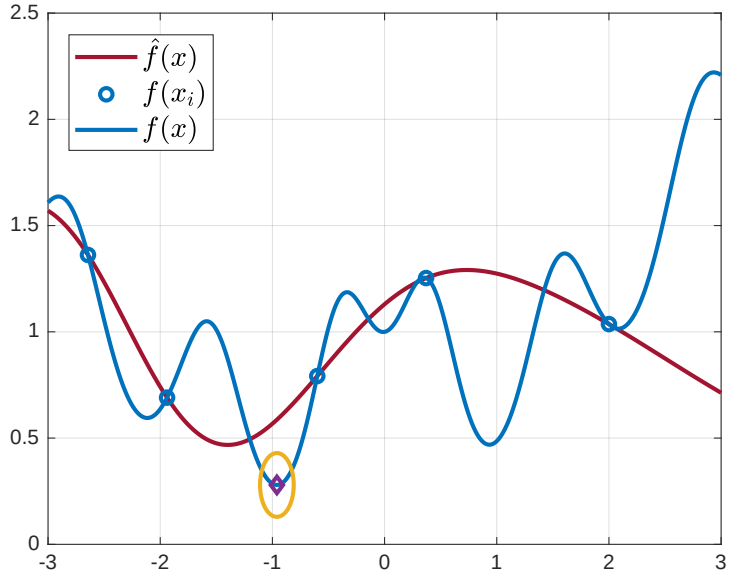
AUTO-TUNING - GLIS ALGORITHM

- **Goal**: solve the **global optimization** problem

$$\begin{aligned} \min_x \quad & f(x) \\ \text{s.t.} \quad & \ell \le x \le u \\ & g(x) \le 0 \end{aligned}$$



- **Step #0**: Get random initial samples $x_1, \ldots, x_{N_{\text{init}}}$ **(Latin Hypercube Sampling)**

- **Step #1**: assume $f(x)$ was sampled at $x_1, \ldots, x_N$. Build the **surrogate function**

$$\hat{f}(x) = \sum_{i=1}^{N} \beta_i \phi(\epsilon \|x - x_i\|_2)$$

$\phi =$ radial basis function

Example: $\phi(\epsilon d) = \frac{1}{1+(\epsilon d)^2}$ *(inverse quadratic)*

Vector β solves $\hat{f}(x_i) = f(x_i)$ for all $i = 1, \ldots, N$ (=linear system)

- **CAVEAT**: build and minimize $\hat{f}(x_i)$ iteratively may easily miss global optimum!