#### **Effective Programming Practices for Economists**

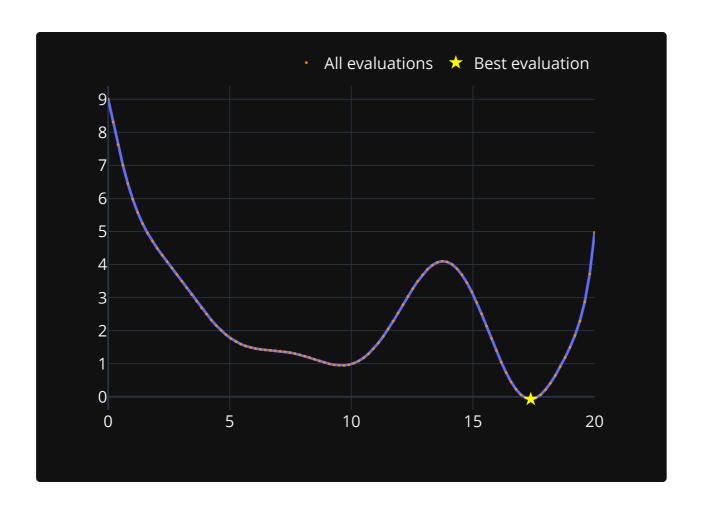
# **Numerical Optimization**

#### **Grid Search**

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### **Grid Search**

- Very simple!
- Fix a grid of parameter values.
- Evaluate the function at each grid point.
- Pick the best.



# **Grid Search: Properties**

- Needs bounds on the parameter (0 to 20 in our case).
- Desired precision determines number of grid points.
- Very feasible in one dimension.
- Else: Curse of dimensionality.

## **Curse of Dimensionality**

- Suppose we have p>1 parameters.
- If we use n grid points in each dimension, we require  $n^p$  function evaluations.
- This grows exponentially with p, making grid search infeasible in higher dimensions.
- Example:
  - 5 parameters and 100 grid points per parameter
  - $100^5 = 10^{10}$  required function evaluations
  - Assume one function evaluation takes 1 millisecond
  - $10^{10}$  milliseconds pprox 115 days