## Convergence Analysis Report

August 2, 2025

I	jthead; Optimizer	Mean Function Evaluat
jh2;Convergence Speed Analysisj/h2;	i/thead; itbody; itd class="best"; QQN-GoldenSection	
	jtd class=""¿L-BFGS	
	itd class=""¿L-BFGS-Aggressive	
	¡td class="qqn";QQN-Bisection-1	
	¡td class="qqn"¿QQN-Bisection-2	
	jtd class="qqn";QQN-StrongWolfe	
	jtd class="qqn"¿QQN-CubicQuadraticInterpolation	
	jtd class=""¿L-BFGS-MoreThuente	
	itd class="";L-BFGS-Limited	
	itd class=""¿GD-AdaptiveMomentum	
	itd class=""¿GD-Momentum	
	itd class="";L-BFGS-Conservative	
	jtd class=""¿Adam-Fast	
	jtd class=""¿GD-Nesterov	
	¡td class=""¿Adam-Robust	
	¡td class=""¿Trust Region-Aggressive	
	¡td class=""¿GD-WeightDecay	
	¡td class=""¿GD	
	¡td class=""¿Trust Region-Standard	
	¡td class=""¿Trust Region-Precise	
	¡td class=""¿Trust Region-Adaptive	
	jtd class=""¿Trust Region-Conservative	
	jtd class="";Adam-AMSGrad	
	jtd class="";Adam-WeightDecay	
	itd class="";Adam	
	i/tbody;	
 strong;Purpose::/strong; Compares c	convergence rates for different optimizers based on total	 function

evaluations (function + gradient evaluations). Sorted by fastest overall convergence (weighted average). Best performer is highlighted in bold, QQN variants in green.  $i/p_i$