

Table 1: Performance Results for Trigonometric\\$\_5DProblem

Optimizer	Mean Final Value	Std Dev	Best Value	Worst Value	Mean Func Evals	Success Rate (%)	Mean Time (s)
<b>QQN-Bisection-2</b>	$9.15 \times 10^{-5}$	$3.88 \times 10^{-4}$	$1.28 \times 10^{-16}$	$1.74 \times 10^{-3}$	352.8	80.0	0.009
QQN-MoreThuente	$9.85 \times 10^{-4}$	$2.43 \times 10^{-3}$	$1.92 \times 10^{-16}$	$9.01 \times 10^{-3}$	385.1	75.0	0.009
QQN-StrongWolfe	$6.32 \times 10^{-3}$	$1.54 \times 10^{-2}$	$1.32 \times 10^{-17}$	$5.26 \times 10^{-2}$	272.2	70.0	0.009
GD-WeightDecay	$1.31 \times 10^{-2}$	$2.55 \times 10^{-2}$	$3.46 \times 10^{-10}$	$8.87 \times 10^{-2}$	150.9	65.0	0.005
QQN-Bisection-1	$6.86 \times 10^{-3}$	$1.45 \times 10^{-2}$	$6.80 \times 10^{-17}$	$5.47 \times 10^{-2}$	353.9	60.0	0.009
QQN-Backtracking	$1.59 \times 10^{-3}$	$5.52 \times 10^{-3}$	$2.14 \times 10^{-17}$	$2.49 \times 10^{-2}$	344.1	55.0	0.013
QQN-GoldenSection	$1.84 \times 10^{-3}$	$6.22 \times 10^{-3}$	$4.87 \times 10^{-17}$	$4.17 \times 10^{-2}$	819.6	50.0	0.015
QQN-CubicQuadraticInterpolation	$6.54 \times 10^{-2}$	$1.66 \times 10^{-1}$	$5.14 \times 10^{-16}$	$6.30 \times 10^{-1}$	379.8	10.0	0.015
L-BFGS-Conservative	$3.35 \times 10^{-4}$	$1.46 \times 10^{-3}$	$1.25 \times 10^{-13}$	$6.68 \times 10^{-3}$	618.4	5.0	0.013
Adam-WeightDecay	$2.74 \times 10^{-2}$	$3.10 \times 10^{-2}$	$1.16 \times 10^{-6}$	$8.56 \times 10^{-2}$	418.4	5.0	0.010
Adam	$1.23 \times 10^{-1}$	$1.17 \times 10^{-1}$	$1.18 \times 10^{-9}$	$4.39 \times 10^{-1}$	498.9	5.0	0.011
GD	$6.00 \times 10^{-3}$	$1.47 \times 10^{-2}$	$5.26 \times 10^{-9}$	$5.40 \times 10^{-2}$	335.0	0.0	0.009
GD-Nesterov	$2.33 \times 10^{-2}$	$2.66 \times 10^{-2}$	$6.94 \times 10^{-4}$	$7.13 \times 10^{-2}$	32.8	0.0	0.001
Adam-Fast	$4.40 \times 10^{-2}$	$4.63 \times 10^{-2}$	$8.05 \times 10^{-4}$	$1.85 \times 10^{-1}$	52.0	0.0	0.001
Trust Region-Conservative	$7.45 \times 10^{-2}$	$1.19 \times 10^{-1}$	$3.11 \times 10^{-3}$	$4.59 \times 10^{-1}$	372.4	0.0	0.003
GD-Momentum	$1.01 \times 10^{-1}$	$7.22 \times 10^{-2}$	$7.53 \times 10^{-3}$	$2.61 \times 10^{-1}$	25.7	0.0	0.001
Adam-AMSGrad	$1.05 \times 10^{-1}$	$7.88 \times 10^{-2}$	$6.12 \times 10^{-7}$	$3.51 \times 10^{-1}$	502.0	0.0	0.012
Trust Region-Adaptive	$1.25 \times 10^{-1}$	$5.84 \times 10^{-2}$	$3.13 \times 10^{-2}$	$2.39 \times 10^{-1}$	22.2	0.0	0.000
Trust Region-Standard	$3.57 \times 10^{-1}$	$2.03 \times 10^{-1}$	$6.34 \times 10^{-2}$	$9.69 \times 10^{-1}$	8.8	0.0	0.000
L-BFGS-Aggressive	1.40	$6.81 \times 10^{-1}$	$1.25 \times 10^{-1}$	2.65	771.9	0.0	0.006
L-BFGS	2.13	2.43	$9.90 \times 10^{-5}$	$1.12 \times 10^1$	231.8	0.0	0.004