Table 1: Performance Results for Sphere\_10D Problem

Optimizer	Mean Final Value	Std Dev	Best Value	Worst Value	Mean Func Evals	$\begin{array}{c} {\rm Success} \\ {\rm Rate} \ (\%) \end{array}$	$\begin{array}{c} \text{Mean Time} \\ \text{(s)} \end{array}$
L-BFGS-	0.00e0	0.00e0	0.00e0	0.00e0	10.0	100.0	0.000
MoreThuente							
L-BFGS-	0.00e0	0.00e0	0.00e0	0.00e0	10.0	100.0	0.000
Aggressive							
QQN-	0.00e0	0.00e0	0.00e0	0.00e0	11.0	100.0	0.000
StrongWolfe							
QQN-	0.00e0	0.00e0	0.00e0	0.00e0	12.0	100.0	0.000
CubicQuadraticInt	erpolation						
QQN-Bisection-	0.00e0	0.00e0	0.00e0	0.00e0	13.0	100.0	0.000
QQN-Bisection-	0.00e0	0.00e0	0.00e0	0.00e0	15.0	100.0	0.000
L-BFGS	0.00e0	0.00e0	0.00e0	0.00e0	15.0	100.0	0.000
L-BFGS-	1.08e-3	1.10e-3	5.57e-7	4.03e-3	40.3	100.0	0.000
Limited	1.006-0	1.106-0	0.016-1	4.096-9	40.0	100.0	0.001
QQN-	1.60e-13	1.03e-14	1.45e-13	1.79e-13	46.0	100.0	0.000
GoldenSection	1.006-15	1.056-14	1.406-10	1.796-13	40.0	100.0	0.000
GD-	4.61e-3	1.67e-4	4.33e-3	4.92e-3	62.5	100.0	0.002
WeightDecay	4.016-3	1.076-4	4.000-0	4.926-3	02.0	100.0	0.002
GD	4.91e-3	5.40e-5	4.82e-3	5.00e-3	192.4	100.0	0.005
L-BFGS-	4.51e-3	2.33e-4	4.02e-3 4.20e-3	4.95e-3	197.5	100.0	0.005
Conservative	4.016-0	2.556-4	4.206-3	4.996-9	197.0	100.0	0.005
Adam-	4.92e-3	3.21e-5	4.88e-3	4.98e-3	968.0	100.0	0.022
WeightDecay	4.926-0	5.216-0	4.000-0	4.900-3	300.0	100.0	0.022
Adam	4.98e-3	5.65e-5	4.94e-3	5.21e-3	2391.8	95.0	0.053
GD-Momentum	1.70e-1	2.92e-1	2.45e-5	7.34e-1	19.4	75.0	0.003 $0.001$
GD-Nesterov	1.70e-1 1.59e-1	$2.32e^{-1}$ $2.14e^{-1}$	1.53e-5	4.62e-1	19.4	65.0	0.001
Trust Region-	5.27e-1	7.84e-1	1.01e-4	2.83e0	504.0	65.0	0.001
Precise Precise	0.276-1	1.046-1	1.016-4	2.0360	504.0	00.0	0.003
GD-	5.51e-1	6.74e-1	2.42e-4	1.41e0	18.4	60.0	0.001
AdaptiveMomentu		0.740-1	2.420-4	1.4100	10.4	00.0	0.001
Trust Region-	3.41e-1	3.63e-1	1.07e-3	1.34e0	2968.8	35.0	0.020
Conservative	J.416-1	5.056-1	1.016-0	1.0460	2300.0	55.0	0.020
Trust Region-	7.30e2	5.96e2	2.03e-4	1.22e3	139.3	30.0	0.001
Adaptive	1.5062	0.3062	2.056-4	1.2269	109.0	30.0	0.001
Trust Region-	6.75e2	1.25e3	2.86e-5	6.06e3	51.8	15.0	0.000
Standard	0.7562	1.2000	2.006-0	0.0065	31.6	15.0	0.000
Adam-Robust	1.08e-1	3.40e-2	4.84e-2	1.71e-1	2502.0	0.0	0.060
Adam-Robust Adam-	2.64e-1	4.59e-2	4.64e-2 1.95e-1	3.63e-1	2502.0 $2502.0$	0.0	0.059
AMSGrad	4.04C-1	4.036-2	1.396-1	ə.uəe-1	4004.0	0.0	0.009
Adam-Fast	6.12e-1	2.40e-2	5.73e-1	6.56e-1	37.4	0.0	0.001
Trust Region-	1.09e4	2.40e-2 1.85e3	5.73e-1 5.34e3	1.18e4	30.3	0.0	0.001 $0.000$
Aggressive	1.0364	1.0969	J.J4EJ	1.1064	<b>5</b> 0.5	0.0	0.000
Aggressive							