<div align="center">

Optimization
Homework 1

Hector G. Flores Rodriguez (Id. 25721714)

October 20, 2017

</div>

1. Problem 1

1-(b) Results

Sampled from a normal distribution with $\mu = 1$ and $\sigma = 3$. Used the generalized multi-dimensional rosenbrock for dimension: $n = 2$ and $n = 10$. Reported below are the averages and standard deviates for the parameters.

Used conjugate gradient descent with newton's method for line search. The attached code contains more simulations and results with varying parameters.

The optimal solutions for the 2-D problem is the vector $\mathbf{1}$ in dimension N

Table 1: Results for 2-D Rosenbrock with 20 max iterations and 5 restarts

	x1	x2	total_cg_iters	total_restarts
	0.742835	0.55607669912270873969	20.0	4.0
	2.148826	4.63062908223230529359	20.0	4.0
	0.8548525	0.72751165387310512411	20.0	4.0
	1.7854786	3.19966001366487295954	20.0	4.0
	1.4852286	2.21516907478576596802	20.0	4.0
Avg:	1.403	2.265	20.0	4.0
Std:	0.601	1.714	0.0	0.0

Table 2: Results for 10-D Rosenbrock with 200 max iterations and 5 restarts

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	total_cg_iters	total_res
	0.999	0.997	0.996	0.992	0.982	0.964	0.928	0.862	0.741	0.548	200.0	40.0
	0.999	0.998	0.996	0.993	0.987	0.976	0.955	0.913	0.833	0.693	200.0	40.0
	1.000	0.999	0.997	0.993	0.987	0.973	0.944	0.890	0.790	0.623	200.0	40.0
	-0.992	0.995	0.995	0.992	0.984	0.968	0.938	0.879	0.771	0.593	200.0	40.0
	-0.994	0.998	1.002	1.007	1.01	1.030	1.062	1.128	1.274	1.625	200.0	40.0
Avg:	0.202	0.997	0.997	0.995	0.991	0.982	0.965	0.934	0.882	0.816	200.0	40.0
Std:	1.091	0.001	0.002	0.006	0.013	0.027	0.054	0.109	0.221	0.455	0.0	0.0