EECS 868 Mathematical Optimization with Communications Applications

Spring Semester 2019

Assignment **#1** Due **29 January 2019**

Reading: Luenberger: Chapter 1; Sections 6.1 - 6.3; Appendix A (review/study as necessary). Article excerpt (handout) from *AT&T Technical Journal.*

1. Consider the loosely defined problem of "optimizing windshield-wiper *placement* on an automobile." Formulate this as an optimization problem, listing givens, variables, objective function and constraints. There are *many* possible answers. Your formulation need not be mathematically rigorous. For example, a valid objective function statement can be "the area swept by the windshield wipers" without giving an equation for this. What type of an optimization problem is your formulated problem, in terms of the categories listed in class?
2. Prove (using rigorous mathematical language) that minimizing $f(\mathbf{x})$ subject to $\mathbf{x} \in F$ is equivalent to maximizing $-f(\mathbf{x})$ subject to the same constraint.
3. Prove (using rigorous mathematical language) that minimizing $f(\mathbf{x})$ subject to $\mathbf{x} \in F$ is equivalent to minimizing $g(f(\mathbf{x}))$ subject to the same constraint for any monotonic increasing function g.
4. Puzzler (for fun, not graded, no points attached). Attached.

