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Design Optimization HW 2

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Problem 1

Problem 2

Problem 3

Given $f(x)$and $g(x)$ are two convex functions defined on the convex set X

1) Prove that $af(x) + bg(x)$ is a convex set of X

   Let $H(x) = af(x) + bg(x)$. Assume

2) In what conditions will $f\big(g(x)\big)$ be convex

Problem 4

Show $f(x_1) \geq f(x_0) + {g_{x_0}}^T(x_1 - x_0)$ for a convex function $f(x): X \to \mathbb{R}$ and for $x_0, x_1 \in X$

Problem 5

1) Formulate this problem as an optimization problem.
2) Is your problem convex?
3) If we require the overall power output of any of the n lamps to be less than p^*, will the problem have a unique solution?

4) If we require no more than half of the lamps to be switched on, will the problem have a unique solution?