Practice Problem

EE5138/EE6138 Optimization for Electrical Engineering

Note: The symbols [L], [M], and [H] shown at the beginning of each problem indicate the difficulty levels, which are "Low", "Medium", and "High", respectively.

Convex Sets

1. [L] Textbook Exercises 2.1 (you only need to show the case for $k = 3$)
2. [L] Textbook Exercises 2.2 (you only need to show the first part for the convex-set case)
3. [M] Textbook Exercises 2.10 (a) (hint: a set is convex if and only if its intersection with an arbitrary line $\{\hat{x} + tv | t \in \mathbf{R}\}$ is convex)
4. [L] Textbook Exercises 2.11 (you only need to show the general case of $n \geq 2$)
5. [H] Textbook Exercises 2.12 (g)

Convex Functions

1. [L] Textbook Exercises 3.2
2. [M] Textbook Exercises 3.16
3. [H] Textbook Exercises 3.17
4. [M] Textbook Exercises 3.22 (a) and (b)

Convex Optimization Problems

1. [L] Textbook Exercises 4.11 (a) and (b)
2. [L] Textbook Exercises 4.15
3. [L] Textbook Exercises 4.20
4. [M] Textbook Exercises 4.24 (consider only the case of $p = 2$)
5. [M] Textbook Exercises 4.26 (a)
6. [M] Textbook Exercises 4.33
7. [H] Textbook Exercises 4.40 (b) (consider only the two cases of QP and QCQP; hint: express $P = WW^T$ for QP and $P_i = W_i W_i^T$ for QCQP)

Duality and KKT Conditions

1. [L] Textbook Exercises 5.1 (a)-(c)
2. [H] Textbook Exercises 5.11
3. [H] Textbook Exercises 5.26
4. [M] Textbook Exercises 5.39

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