COMP4680/COMP8650: Advanced Topics in SML
Assignment #2: Convex Sets and Convex Functions

Due: 11:55pm on Friday 17 August, 2018.
Submit as a single PDF file via Wattle.

Numbers (e.g., **X.YY**) refer to questions from the textbook *Boyd and Vandenberghe*, "Convex Optimization", 2004. All questions are of equal value.

- **Halfspace.** Consider the set $H = \{x \in \mathbb{R}^n \mid \|x - x_0\|_2 \leq \|x - x_1\|_2\}$ for fixed x_0 and x_1. Show that H is a half-space.

- **Polyhedron.** Consider the polyhedron in $\mathbb{R}^2$ defined as the convex hull over the following set of points

$$\{(-1, 2), (0, 3), (2, 0), (2, -2), (0, 0), (-1, 0)\}.$$

  Express the polyhedron in the form $Ax \preceq b$.

- **2.12**

- **2.15** (a), (b), (e), (f)

- **3.14**

  Hint: Think of first- and second-order conditions for optimality.

- **3.16**

- **3.36** (a), (b) and (e)

Be sure to justify your answers.