Math 6140 - Assignment 2

Due January 31, 2018

A. Let M be an R-module with submodules A, B, C. Show that if $A \leq C$, then $A + (B \cap C) = (A + B) \cap C$.

This is known as the *modular law*. Show that the equation need not hold if $A \not\leq C$.

B. (a) Show that $\mathbb{Q}$ is not finitely generated as $\mathbb{Z}$-module.

    (b) Determine $\operatorname{Hom}_{\mathbb{Z}}(\mathbb{Q}, \mathbb{Z})$.