Math Studies Algebra: homework #8*
Due 28 October 2015, at start of class

Collaboration and use of external sources are permitted, but must be fully acknowledged and cited. For your own learning, you are advised to work individually. Collaboration may involve only discussion; all the writing must be done individually.

Homework must be submitted in LaTeX via e-mail under the same rules as the previous homeworks.

1. Let G be a nilpotent group. Let $H = \{g \in G : |g| < \infty\}$ be the set of all elements of finite order. Show that H is a subgroup of G.

2. True or false: semidirect product of two nilpotent groups is nilpotent. Justify your answer.

3. Let $\mathbb{F}_p = \mathbb{Z}/p\mathbb{Z}$ be the field with p elements. How many subgroups of order p^2 does the Heisenberg group over $\mathbb{F}_p$ have?

4. (Bonus problem) Enjoy your break.