Math 534. Written problems, set 1. Due Thursday, September 22.

1. Let $\mathfrak{g}$ be a Lie algebra.
   (a) Show that if $\mathfrak{h}$ is an ideal in $\mathfrak{g}$, then $[\mathfrak{h}, \mathfrak{h}]$ is also an ideal in $\mathfrak{g}$.
   (b) Let $D^k \mathfrak{g}$ be the $k$-th term of the derived series of $\mathfrak{g}$. Show that it is an ideal in $\mathfrak{g}$.
   (c) Show that $\mathfrak{g}$ is semisimple if and only if it has no non-trivial abelian ideals.

2. Humphreys, Exercise 3 on p.5.

3. Humphreys, Exercise 6 on p.5.