Homework 19 : Due Monday, November 2

Problem 1: Chapter 9, #30

Problem 2: Suppose that G is a group and that H and K are subgroups of G. Recall that G is the internal direct product of H and K if

- $G = HK = \{hk : h \in H, k \in K\}$.
- $H \cap K = \{e\}$
- $hk = kh$ for all $h \in H$ and $k \in K$.

a. Suppose that G is the internal direct product of H and K. Show that both H and K are normal in G.
b. Suppose that $G = HK$, $H \cap K = \{e\}$, and both H and K are normal subgroups of G. Show that G is the internal direct product of H and K.

Problem 3: Chapter 9 Additional Exercises, #2

Problem 4: Chapter 9 Additional Exercises, #4

Problem 5: Chapter 9 Additional Exercises, #5