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