Preliminary problems. These problems should be completed before discussion on Thursday.

(P1) Find all roots of the polynomial $f(x) = 3x^2 + 6$, where

(a) $f(x) \in \mathbb{Z}_2[x]$. (Note: in this case $f(x)$ is identical to $x^2 + 0$.)

(b) $f(x) \in \mathbb{Z}_5[x]$.

(c) $f(x) \in \mathbb{Z}_6[x]$.

(d) $f(x) \in \mathbb{Q}[x]$.