MATH 4P14-5P11, Winter, 2012

ASSIGNMENT #2

Due: 4 p.m. Friday, Feb. 17, 2012

The following questions are from the text book:

Section 2.7. #3 (Hint: if J is a maximal left ideal of S, then $\phi^{-1}(J)$ is a maximal left ideal of R).
Section 2.10. #2
Section 3.2. #2.
Section 3.3. #1.
Section 3.4. # 2 (hint: Assume that $KG =< \hat{G} > +M$. Then $1 = k\hat{G} + m$. Show that $\hat{G} = \hat{G}m \in < \hat{G} > \bigcap M$), #3 .
Section 3.5. # 1.
Section 3.6. #1. (Bonus question.)

The following questions are not from the text book:

Question 1.
Let M be a R-module and N_1, N_2, W_1 and W_2 be submodules of M. Prove that if $M = N_1 \oplus N_2$ and $N_2 = W_1 \oplus W_2$, then $N_1 = (N_1 \oplus W_1) \bigcap (N_1 \oplus W_2)$.

Question 2.
Let $K = Q(\zeta)$ be the cyclotomic extension of Q where ζ is a nth primitive root of unity. For each $n = 7, 8$, find
(1) Cyclotomic polynomial, cyclotomic units, subgroup generated by these units (simplify if possible).
(2) Free ranks of units group $U(O_K)$, where O_K is the ring of algebraic integers in K.

Additional Practice Exercises. Not To Be Submitted.

Section 2.7. # 2 .
Section 2.8. #5 #9.
Section 3.2. # 3, #4, #6.
Section 3.3. #2.
Section 3.4. #4 #5.
Section 3.5. # 2, #3, #4.
Section 3.6. #2, #3(Hint use sec 3.4 #5).