

PROBLEM SET 1

[J]=Jacobson

- (1) [J] p. 215 #2
- (2) [J] p. 215 #4
- (3) [J] p. 215 #6
- (4) [J] p. 215 #8
- (5) Given that $(\ell, 0)$ is constructible ($\ell \in \mathbb{R}_+$), show how to construct $(\sqrt{\ell}, 0)$ and $(\ell^2, 0)$.
- (6) Construct a regular pentagon.
- (7) [J] p. 229 #2
- (8) [J] p. 229 #3
- (9) Find splitting field extensions for $x^3 - 5$ over \mathbb{Z}_7 , \mathbb{Z}_{11} and \mathbb{Z}_{13} .
- (10) Suppose that M/L and L/K are extensions, and that $\alpha \in M$ is algebraic over K . Does $[L(\alpha) : L]$ always divide $[K(\alpha) : K]$?