41. Dummit-Foote, 9.4, #1 AND #2.

42. Dummit-Foote, 9.4, #3 AND #4.

43. Let $F$ be an infinite field. Show that $F^\times$ is not cyclic.

44. For all primes $p$, give the factorization of $X^4 + 1$ in $\mathbb{F}_p[X]$.

45. We say a domain $R$ (with fraction field $F$) is \textit{integrally closed} provided that if $r \in F$ satisfies a monic polynomial in $R[X]$, then $r \in R$. Show that any UFD is integrally closed.