Math 210C Algebra: Homework 6

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Exercise 1. *Let D be a division algebra with center K. Let L be a maximal subfield of D with $[L : K] = n$, show that $D \otimes_K L \cong M_n(L)$.*

Proof. Repeating the argument from above, we have that $D \otimes_K L$ is simple, and being a finite dimensional algebra over K yields that it is left artinian. Thus, by the Artin-Wedderburn Theorem, we have that $D \otimes_K L \cong M_m(D_L)$ for some $m \in \mathbb{N}$ and D_L a division algebra over L.

Lemma L is a separable extension.
Proof of lemma: We have that □