MATH-UA 349: Homework 6

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1 Problem 1

Select nonzero $r \in R$ arbitrarily. Since R is a vector space over f, we have $RF \subseteq F$; hence selecting nonzero $f \in F$, we have

$$rf \in F.$$

Since rf is nonzero, it has a multiplicative inverse f^*. We conclude that $r(ff^*) = (ff^*)r = 0$, so r is a unit. Hence R is a field.