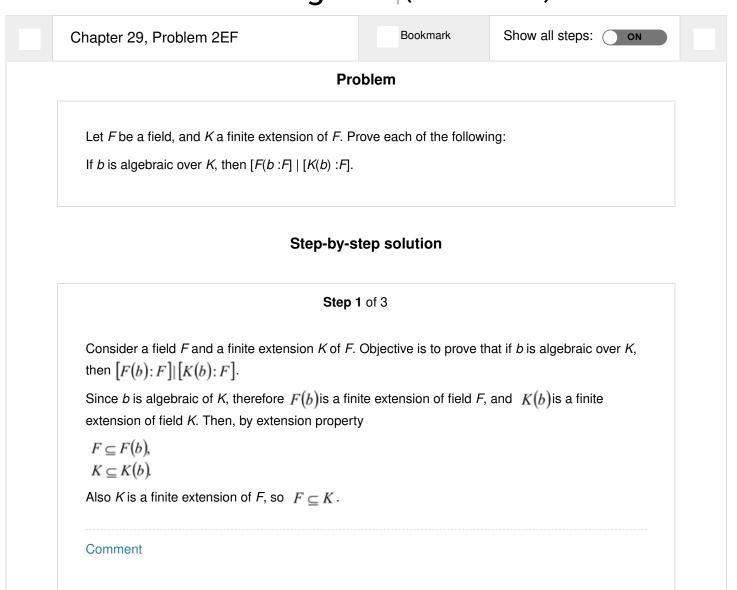
A Book of Abstract Algebra (2nd Edition)





On combining the above relationship, one gets

$$F \subseteq F(b) \subseteq K(b)$$

Then by the formula for degree calculation of field,

$$[K(b):F]=[K(b):F(b)]\cdot [F(b):F].$$

Here, $[K(b): F(b)] \neq 0$ and equals to some finite integer because K is a finite extension of F. Thus, by the divisibility rule it implies that [F(b): F] divides [K(b): F].

.....

Comment

Step 3 of 3

Hence, if b is algebraic over K, then [F(b):F] | [K(b):F].

.....

Comment