

A Book of Abstract Algebra | (2nd Edition)

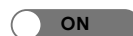


Chapter 29, Problem 6EE



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Problem

If a and b are algebraic over F , prove that $F(a, b)$ is a finite extension of F .

Step-by-step solution

Step 1 of 2

Consider a field F . Suppose a and b are algebraic over F . The objective is to prove that

$F(a, b)$ is a finite extension of F .

[Comment](#)

Step 2 of 2

Since b is algebraic over F , it is algebraic over $F(a)$.

Thus, $[F(a, b) : F(a)]$ is finite.

Then $[F(a, b) : F] = [F(a, b) : F(a)][F(a) : F] < \infty$.

Therefore , $F(a,b)$ is a finite extension of F .

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