

A Book of Abstract Algebra | (2nd Edition)

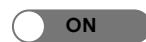


Chapter AB, Problem 12E



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Problem

Prove that the following are true for any integers a , b , and c :

If $\text{lcm}(a, b) = c$, then $\text{gcd}(a, b) = 1$.

Step-by-step solution

Step 1 of 2

Objective:-

The objective is to prove *if $\text{lcm}(a, b) = ab$, then $\text{gcd}(a, b) = 1$.*

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Step 2 of 2

Proof:-

Let us consider the theorem.

Theorem:- If p and q are two integers with greatest common divisor $\gcd(p, q)$ and least common multiple $\text{lcm}(p, q)$, then

$$p \times q = \gcd(p, q) \times \text{lcm}(p, q)$$

Let us suppose $\text{lcm}(a, b) = ab$. Then by above theorem:-

$$a \times b = ab \times \gcd(a, b)$$

$$1 = \gcd(a, b)$$

$$\gcd(a, b) = 1$$

Proved

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