

A Book of Abstract Algebra | (2nd Edition)

Chapter AB, Problem 6E

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Problem

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

If $a > 0$, then $\gcd(a, 0) = a$.

Step-by-step solution

Step 1 of 2

Objective:-

The objective is to prove *if $a > 0$, then $\gcd(a, 0) = a$.*

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Step 2 of 2

Proof:-

Let us consider the theorem.

Theorem:-Any two nonzero integers r and s have a unique positive greatest common divisor t . Moreover, t is equal to a "Linear combination" of r and s . That is,

$$t = kr + ls \text{ for some integer } k \text{ and } l$$

Now aim will be to write a as linear combination of integer 0 and a . The integer a can be written as linear combination of the integer 0 and a . That is:-

$$a = 1 \cdot a + 0 \cdot 0 \text{ for some integer } b$$

Hence, according to the definition a is greatest common divisor of 0 and a .

$$\boxed{\gcd(a, 0) = a.}$$

Proved

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