How do I prove that gcd (a, b, c) = gcd (a, gcd (b, c))? Note that if you want to use any facts about gcd (a, b, c) beyond the definition, you will need to prove them.

Answer · Follow · 2 · Request

All related (31) · Sort · Recommended

Luís Sequeira · Follow
PhD in Mathematics, University of Lisbon (Graduated 2001) · Upvoted by Michael Jørgensen, PhD in mathematics · 3y

It is actually pretty easy.

Let $g = gcd(a, b, c)$ and let $h = gcd(a, gcd(b, c))$.

Note that both are positive integers.

Clearly $h \mid a, h \mid gcd(b, c)$ so we indeed we have

$h \mid a, h \mid b, h \mid c$

so, by definition of gcd, also

$h \mid g$

On the other hand, since

$g \mid a, g \mid b, g \mid c$

we also have (again by definition of gcd)

$g \mid a, g \mid gcd(b, c)$

and therefore

$g \mid h$

And since two positive integers that are factors of each other must be equal, the conclusion follows.

5.7K views · View 6 upvotes

6

Enrico Gregorio · Follow
Associate professor in Algebra · 3y

Related **How can I prove that gcd (gcd (r, s), t) = gcd (r, gcd (s, t))?**

The greatest common divisor between natural numbers a and b can be characterized as