proof of Bezout's Theorem

Canonical name	ProofOfBezoutsTheorem
Date of creation	2013-03-22 13:19:58
Last modified on	2013-03-22 13:19:58
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Last modified by	Thomas Heye (1234)
Numerical id	7
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Entry type	Proof
Classification	msc 13F07

Let D be an integral domain with an Euclidean valuation. Let $a, b \in D$ not both 0. Let $(a, b) = \{ax + by | x, y \in D\}$. (a, b) is an ideal in $D \neq \{0\}$. We choose $d \in (a, b)$ such that $\mu(d)$ is the smallest positive value. Then (a, b) is generated by d and has the property $d|a$ and $d|b$. Two elements x and y in D are associate if and only if $\mu(x) = \mu(y)$. So d is unique up to a unit in D. Hence d is the greatest common divisor of a and b.