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MODULE GCD
EXTENDS Integers, FiniteSets, TLAPS, NaturalsInduction

Divides(p, n)  ≜  ∃ q ∈ Int : n = p * q
DivisorsOf(n)  ≜  {p ∈ Int      : Divides(p, n)}

SetMax(S)  ≜  CHOOSE i ∈ S : ∀ j ∈ S : i ≥ j

GCD(m, n)  ≜  SetMax(DivisorsOf(m) ∩ DivisorsOf(n))

THEOREM GCD1  ≜  ∀ m ∈ Nat \ {0} : GCD(m, m) = m
THEOREM GCD2  ≜  ∀ m, n ∈ Nat \ {0} : GCD(m, n) = GCD(n, m)
THEOREM GCD3  ≜  ∀ m, n ∈ Nat \ {0} : (n > m) ⇒ (GCD(m, n) = GCD(m, n − m))
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