The Remainder Function PhL 11.22.04

As usual, I get confused by the most trivial of things, so here goes.

1. Integer Part. Suppose we have two positive real numbers x and y. Then define

Int(x/y) ≡ the integer part of the result of dividing x by y.
= int(x/y) in Excel = floor(x/y,1).

Example: Int(5.3/2.1) = Int(2.5238) = 2.

2. Fractional Part. Suppose we have two positive real numbers x and y. Then define

Frac(x/y) ≡ the fractional part of the result of dividing x by y
= (x/y) - int(x/y) in Excel

Example: Frac(5.3/2.1) = Frac(2.5238) = .5238

Theorem #1: (x/y) = Int(x/y) + Frac(x/y) Proof: obvious except at boundaries

3. **Remainder (Mod)**. Suppose we have two positive real numbers x and y. Then define:

Rem(x,y) ≡ x - Int(x/y)*y
= mod(x,y) in Excel

This is meant to be what is left over (the remainder) after you keep subtracting y from x until the result is in the range (0,y).

Example: Rem(5.3, 2.1) = 5.3 - Int(5.3/2.1)*2.1 = 5.3 - 2*2.1 = 5.3 - 4.2 = 1.1

Theorem #2: Rem(x,y) = Frac(x/y)*y

Proof: Rem(x,y) ≡ x - Int(x/y)*y = [(x/y) - Int(x/y)]*y = Frac(x/y)*y by Theorem 1.

This Rem(x,y) is the same as the Modulo function mod(x,y).

Results so far are compatible with http://www.voidware.com/modsecret.htm.

Fact: In the C language there is an operator % and you can talk about x % y. However, it is only defined for x,y being integers. If you want the general thing, you have to use fmod(x,y).