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zero polynomial

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The *zero polynomial* in a ring  $R[X]$  of polynomials over a ring  $R$  is the identity element  $\mathbf{0}$  of this polynomial ring:

$$f + \mathbf{0} = \mathbf{0} + f = f \quad \forall f \in R[X]$$

So the zero polynomial is also the absorbing element for the multiplication of polynomials.

All coefficients of the zero polynomial are equal to 0, i.e.

$$\mathbf{0} := (0, 0, 0, \dots).$$

Because always

$$f \cdot \mathbf{0} = \mathbf{0}$$

and because in general  $\deg(fg) = \deg(f) + \deg(g)$  when  $R$  has no zero divisors, one may define that the zero polynomial has no <http://planetmath.org/Polynomialdeg> at all, or alternatively that

$$\deg(\mathbf{0}) = -\infty$$

(see the extended real numbers).