Structural or analytic derivation

Initializing $p = A[n]$ and looping from $n - 1$ down to zero removes the first multiplication by zero and uses exactly n multiplications and n additions. This is the nested affine-composition representation of the polynomial. A first-order jet carried through the same loop yields the value and derivative together with only constant overhead per coefficient.

Comparative cost and preferred method

The printed Horner procedure is $\Theta(n)$, compared with the requested naive-from-scratch $\Theta(n^2)$ evaluator. Reading arbitrary coefficients gives an $\Omega(n)$ input lower bound. A conventional power accumulator also achieves $\Theta(n)$, so Horner's asymptotic advantage is specific to the prescribed naive baseline; its smaller operation count and natural derivative extension remain useful.