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Explicit evaluation of sums using derivative polynomials

A derivative polynomial refers to function, $f(x)$, whose derivative is a polynomial of the original function. As an example, $f(x) = e^x$ has derivative polynomial $P(x) = x$ since $f'(x) = P(f(x))$. When a function satisfies a derivative polynomial, all higher order derivatives also satisfy polynomial expressions. We will show that in some cases, derivative polynomials are useful in explicit evaluation of infinite sums, and in particular show a generalization of Euler's Theorem for evaluation of $\zeta(2k)$.