technique for computing residues

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The following two facts are quite useful for computing residues:
If f has a pole of order at most $n + 1$ at x, then

$$\operatorname{Res}(f; x) = \lim_{y \to x} \frac{1}{n!} \frac{d^n}{dy^n} \left((y - x)^{n+1} f(y) \right).$$

If g is regular at x and f has a simple pole at x, then $\operatorname{Res}(fg; x) = g(x) \operatorname{Res}(f; x)$.