Power series

Kharkar says that if f is analytic over a domain then within a disk $\{z : |z - z_0| < R\}$ contained in that domain, it has a power series valid in the disk with the formula

$$\sum_{k=0}^{\infty} a_k \ (z - z_0)^k$$

and that the coefficients are given by

$$a_k = \frac{1}{2\pi i} \int_{\gamma} \frac{f(z)}{(z - z_0)^{k+1}} \ dz$$

where γ is the circle with radius r and

$$|z - z_0| < r < R$$

Note, however, that the coefficients are also given by

$$a_k = \frac{1}{k!} \ f^{(k)}(z_0)$$