1. In class, we proved the Cauchy integral formula:
   \[ f(z) = \frac{1}{2\pi i} \oint_C \frac{f(s)}{s-z} \, ds, \]
as well as the first derivative version:
   \[ f'(z) = \frac{1}{2\pi i} \oint_C \frac{f(s)}{(s-z)^2} \, ds. \]

   Complete the proof using an induction argument to show that
   \[ f^k(z) = \frac{k!}{2\pi i} \oint_C \frac{f(s)}{(s-z)^{k+1}} \, ds. \]