MATH 2250, Fall 2010.
Homework assignment, Oct. 18, 2010

1. Let Ω be a domain in $\mathbb{C}$ with connected and unbounded complement. Show that for any $a \notin \Omega$ any closed contour γ in Ω has index 0 with respect to a. In other words, show that

$$\int_\gamma \frac{dz}{z-a} = 0.$$

Deduce from here that for any $a \notin \Omega$ there exists an analytic in Ω branch of $\log(z-a)$.