Homework 16

Problem 1. Suppose that $\gamma : [a, b] \to G \subset \mathbb{C}$ is smooth and $f : G \to \mathbb{C}$ is analytic. If there exists $F : G \to \mathbb{C}$ with $F' = f$, prove that

$$\int_{\gamma} f \, dz = F(\gamma(b)) - F(\gamma(a))$$

Problem 2. Let $c$ be a fixed complex number and suppose that $\gamma$ is a counter-clockwise circle of radius $r$ centered at $c$. For each integer $n$ (positive, negative or zero), compute

$$\int_{\gamma} \frac{dz}{(z - c)^n}$$