

**Assignment 11 - Integration Theorems II + Taylor Series**

**Due April 23rd**

1. (1 pt) Let  $f(z) = \text{Log}(e^{2\pi z})$  and  $D$  the open disk of radius 1 around 0. Show that there exists a closed simple curve  $C$  in  $D$  such that  $\int_C f(z)dz \neq 0$ .
2. (1 pt) Show there is no entire function  $f$  such that  $|f(x+iy)| = x^2 + y^2 + 1$ .
3. (1 pt each) Let  $f(z) = \frac{1}{z+i}$ .
  - a) Compute the first four terms of the Taylor series of  $f$  around 0
  - b) Write the Taylor series of  $f$  around 0 (in  $\Sigma$  notation)
  - c) Find the radius of convergence of the Taylor series of  $f$  around 0