Contour Integrals

(a) Consider the integral around the unit circle of

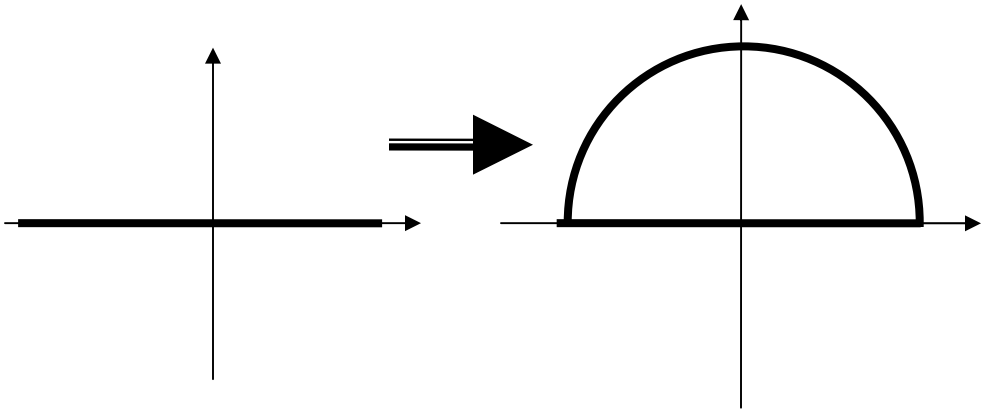
$$\oint \frac{dz}{z}$$

Do this explicitly by changing to r and θ variables.

(b) Consider the integral

$$\int_{-\infty}^{\infty} \frac{e^{-ax^2}\,dx}{x - x_0 - i\Gamma}$$

This integral can be done by making it a closed loop in the complex plane, adding the circle at infinity in the upper half plane. Explain why and do the integral.



Integral from –R to R then R→ ∞

Integral from –R to R then around semicircle, then R→ ∞