

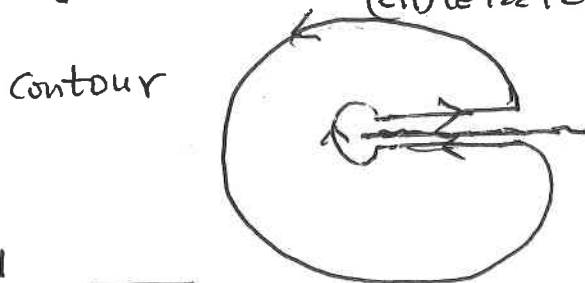
# Math 301-201 Assignment 3

(due: Feb. 22, 2016)

1. Computing the following integrals using complex analysis

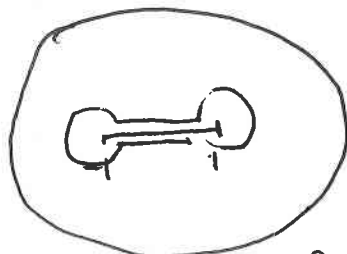
(a) 
$$\int_0^{+\infty} \frac{x}{(x+1)(x^2+2x+2)} dx$$

Hint:  $f(z) = \frac{(\log z) z}{(z+1)(z^2+2z+2)}$



(b) 
$$\int_{-1}^1 \frac{\sqrt{1-x^2}}{x^2+4} dx$$

Hint: Contour



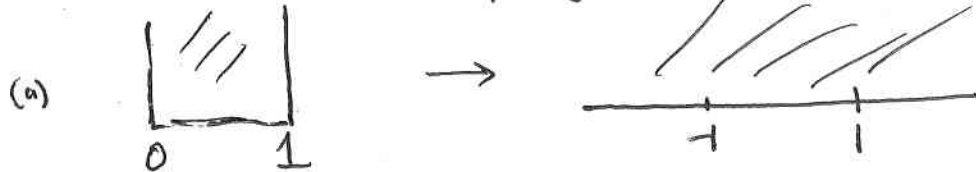
2. Describe the image of each of the following domains under the mapping  $w = e^z$

(a)  $\text{Re } z > 0, 0 < \text{Im } z < \pi$

(b)  $\text{Re } z < 0, 0 < \text{Im } z < \pi$

(c)  $1 < \text{Re } z < 2, 0 < \text{Im } z < \pi$

3. Find a conformal mapping



4. Solve the following Laplace equation  
 $\phi_{xx} + \phi_{yy} = 0, \quad (x, y) \in D$

with

