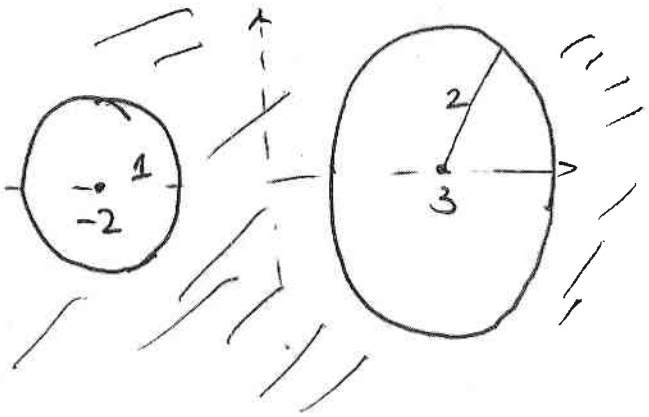
Assignment 5 – MATH 301-201 Due Date: March 18, 2016 (by 6pm)

1. Solve the following Laplace Equation



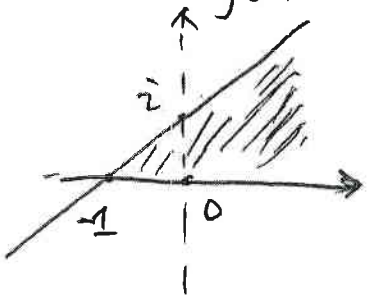
$\phi_{xx} + \phi_{yy} = 0$, $|z+2| > 1$, $|z-3| > 2$

$\phi = 1$ on $|z+2| = 1$

$\phi = 2$ on $|z-3| = 2$

2. Solve the following Laplace Equation

(a)

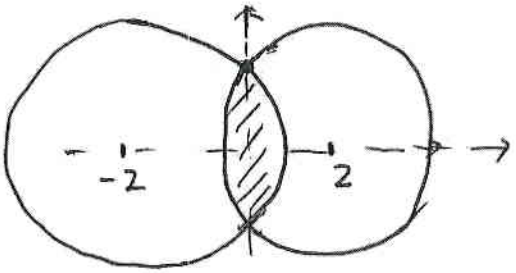


$\phi_{xx} + \phi_{yy} = 0$, on $y > 0$, $x*y > -1$

$\phi = 1$ on $y = 0$, $*$

$\phi = 2$ on $x*y = -1$

(b)

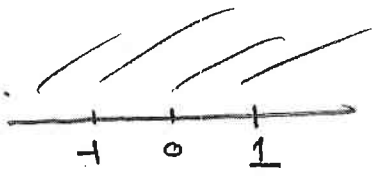


$\phi_{xx} + \phi_{yy} = 0$ on $|z-2| < 3$, $|z+2| < 3$

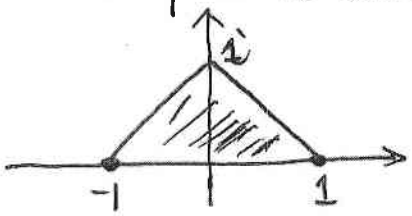
$\phi = 1$ on $|z-2| = 3$

$\phi = 2$ on $|z+2| = 3$

3. Find a conformal map from upper half-space a triangle



→



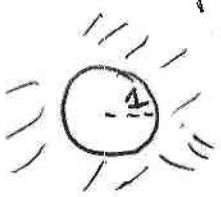
$w_1 = 1$

$w_2 = i$

$w_3 = -1$

4. Find an incompressible and irrotational flow passing through

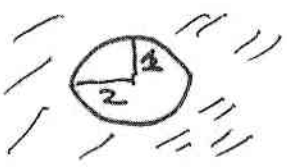
(a)



disk: $|z| = 1$

$\Omega(z) \sim z$ as $|z| \to +\infty$

(b)



ellipse: $\frac{x^2}{4} + \frac{y^2}{1^2} = 1$

$\Omega(z) \sim z$ as $|z| \to +\infty$