

(1) Find a LFT that sends  $2 \rightarrow 1$ ,  $i \rightarrow i$  and  $-2 \rightarrow -1$

(2) Draw a picture with 2 points labeled with their numerical value of the half plane  $y < 1$  and its image under the transformation  $w = (1 + \sqrt{3}i)z$

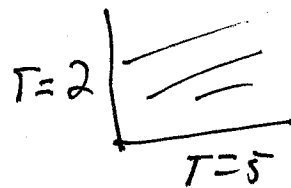
(3) Find the harmonic conjugate of  $h(x, y) = \sinh x \cos y + x^2 - y^2$

(4)  $f(z) = \frac{1+i^2}{1-i^2} = u(x, y) + i v(x, y)$ , Find  $u$  and  $v$

(5) Find a harmonic function on the closed upper half plane so that on the  $x$ -axis  $h(x, 0) = 2$  when  $x < 0$  and  $h(x, 0) = 5$  when  $x > 0$

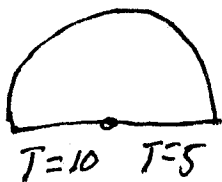
(6)  $\int_0^{2\pi} \frac{d\theta}{1 + \frac{1}{2} \sin \theta}$

(7) In the first quadrant



$T$  is bounded  
find equilibrium  $T$

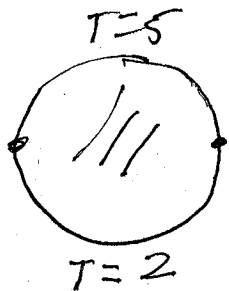
(8)



In unit disk, upper half  
 $T(x, 0) = 10$  when  $x < 0$   $T(x, 0) = 5$  when  $x > 0$

and  $5 + 5 \text{ Arg } z$  on the upper edge,  
Find equilibrium  $T$

(9)



In unit disk

$T = 2$  on lower edge

$T = 5$  on upper edge

Find equilibrium  $T$