

Panel 1

HW - Complex Analysis

- ① Find the natural domain of (a) $f(z) = \frac{z}{z+\bar{z}}$, (b) $g(z) = \frac{1}{1-z\bar{z}}$

Describe your answer in geometric terms or draw it.

- ② Every complex function $f(z) = u(x,y) + i v(x,y)$. Find $u(x,y)$ and $v(x,y)$ for $f(z) = z^3 + z + 1$

- ③ Suppose $f(z) = x^2 - y^2 - 2y + i(2x - 2xy)$. Rewrite the function in terms of z and \bar{z} , where $x = \frac{z+\bar{z}}{2}$ and $y = \frac{z-\bar{z}}{2i}$

- ④ Let $f(z) = x^2 - y^2 + 2ixy$. Rewrite in terms of z and \bar{z} .

- ⑤ Show that $f(z)$ can also be written as $f(z) = u(r,\theta) + i v(r,\theta)$. Find $u(r,\theta)$ and $v(r,\theta)$ for $f(z) = z^2$.

- ⑥ Rewrite $f(z) = z + \frac{1}{z}$ as $u(r,\theta) + i v(r,\theta)$

1

Panel 2

- ④ Visit <http://www.mathcs.org/java/programs/ZMap/index.html> and read "Math Background" and "ZMap Quick Guide"

- ⑤ Answer the first question of the "ZMap Sample Questions"

2