

Panel 1

Complex Homework

① Prove that $\lim_{z \rightarrow i} 3z + 1 = 3i + 1$

② Show that $\lim_{z \rightarrow 0} \left(\frac{z}{\bar{z}} \right)^2$ does not exist.

Hint: Try $(x, 0) \rightarrow (0, 0)$, $(0, y) \rightarrow (0, 0)$ and $(x, x) \rightarrow (0, 0)$

③ Prove that for $f(z) = z^3$ we have: $f'(z) = 3z^2$

Hint: Factor $z^3 - z_0^3$

④ Prove that if $f(z_0) = g(z_0) = 0$ and $f'(z_0)$, $g'(z_0)$ exist

with $g'(z_0) \neq 0$ then

$$\lim_{z \rightarrow z_0} \frac{f(z)}{g(z)} = \frac{f'(z)}{g'(z)}$$