Panel 1

HW - Complex Analysis

① Show that the following limits do not exist:

a) $\lim_{z \to 0} \frac{z + \bar{z}}{z - \bar{z}}$

b) $\lim_{z \to 0} \left(\frac{z}{\bar{z}} \right)^2$

② Find the following limits (they do exist)

a) $\lim_{z \to 2+i} \frac{z^2 - (2+3i)z - (2-4i)}{z - 2i}$

b) $\lim_{z \to -2i} \frac{z^2 + 4}{z^2 + iz + 2}$

Panel 2

③ Use the def. of $\mathbb{C}$-differentiability to prove that

$$\frac{d}{dz}(2z^2 - 3z + 4) = 4z - 3$$

is diffble.

④ Are the following functions $\mathbb{C}$-differentiable?

a) $f(z) = z - \bar{z}$

b) $f(z) = 2x + iy$

c) $f(z) = x^2 - y^2 + 2ixy$

↳ hint. use $x = \frac{z+\bar{z}}{2}$, $y = \frac{z-\bar{z}}{2i}$, simplify, then compare to ③