

Homework 4

Optional extra question.

Q4.3. Let $f(z, z^*)$ be a complex function and \mathbf{f} be the vector field on the complex plane with Cartesian components $(\operatorname{Re} f, \operatorname{Im} f)$. Show that

$$\int_{\partial A} f dz^* = \int_A (\nabla \wedge \mathbf{f} - i \nabla \cdot \mathbf{f}) dA \quad (\text{Q4.3.1})$$

where ∂A is the boundary of the area A in the complex plane. Interpret

$$f = \frac{1}{2\pi z^*} \quad (\text{Q4.3.2})$$

in terms of two dimensional electromagnetism.