

**Exercise.** Define  $u: \mathbb{R}^2 \rightarrow \mathbb{R}$  by

$$u(x, y) = x^2 - y^2.$$

1. Show that  $u$  is harmonic on  $\mathbb{C}$ .
2. Find  $f \in H(\mathbb{C})$  such that  $u = \operatorname{Re} f$ .