EXERCISES, COMPLEX GEOMETRY, UNIVERSITY OF HAMBURG, WINTER SEMESTER 2015/2016

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Sheet 1

Exercise 1. [1, Ex. 1.1.1] Show that every holomorphic map $f\colon \mathbb{C} \longrightarrow \mathbb{H} = \{z \mid \mathrm{im}(z) > 0\}$ is constant.

Exercise 2. [1, Ex. 1.1.2] Show that the real and imaginary part of a holomorphic function $f = u + iv$ are harmonic.

Exercise 3. Show that the image of any holomorphic non-constant map $f\colon \mathbb{C} \longrightarrow \mathbb{C}$ is dense (recall that f has dense image if for any $z \in \mathbb{C}$ and all $\epsilon > 0$, $B_\epsilon(z) \cap \mathrm{im}(f) \neq \emptyset$).

References

[1] D. Huybrechts, *Complex geometry: An introduction*, Springer, Berlin (2005).
[2] M. Kashiwara and P. Shapira, *Sheaves on manifolds*, Springer, Berlin (1994).
[3] C. Schnell, *Complex manifolds*, available at `http://www.math.stonybrook.edu/~cschnell/`.
[4] C. Voisin, *Hodge theory and complex algebraic geometry*, Cambridge University Press, Cambridge (2002).