Fachbereich Mathematik und Statistik Prof. Dr. Salma Kuhlmann Lothar Sebastian Krapp Simon Müller SoSe 2019





## Real Algebraic Geometry II

## Exercise Sheet 10 Fields of generalized power series II

## Exercise 31 (4 points)

Let k be an Archimedean field and let G be an ordered abelian group. Let  $\mathbb{K} = k((G))$ . Moreover, let i be an element in the algebraic closure of K such that  $i^2 = -1$ . Show that

$$\mathbb{K}(\mathbf{i}) \cong k(\mathbf{i})((G)).$$

## Exercise 32 (4 points)

- (a) Show that  $|\mathbb{Q}^{\mathrm{rc}}((\mathbb{Q}))| = 2^{\aleph_0}$ . (Hint: Use without proof that  $\aleph_0^{\aleph_0} = 2^{\aleph_0}$ .)
- (b) Find a countable non-Archimedean real closed subfield of  $\mathbb{Q}^{\mathrm{rc}}((\mathbb{Q}))$ .

Please hand in your solutions by Thursday, 27 June 2019, 10:00h (postbox 14 in F4).