

Approximation Theory and Applications, 2015/16

Second written test

Prof. Stefano De Marchi

Padova, February 24, 2016

The candidate should write on **all** sheets surname, name and “registration number” (i.e numero matricola). Sheets are supplied by the teacher. Do not use any notes and/or books.

1. Provide the definition of *weakly admissible meshes* and enumerate at least *four* of *their properties*.
2. Fekete points can be defined on every compact domain of \mathbb{R}^s ? Are there examples in which we know explicitly the Fekete points?
3. Describe the algorithms that extract the Approximate Fekete Points and Leja sequences.
4. Provide the integral characterization for
 - (a) positive definite functions $\Phi \in \mathbb{R}^s$,
 - (b) positive definite and radial functions $\varphi : [0, \infty) \rightarrow \mathbb{R}$ on \mathbb{R}^s ,
 - (c) strictly positive definite and radial functions $\varphi : [0, \infty) \rightarrow \mathbb{R}$ on \mathbb{R}^s , $\forall s$.
5. Give the definition of the integral operator *monteé* and the differential operator *descente*. Describe also some of their properties.
6. Describe the Backus-Gilbert method for quasi-interpolation. In particular describe why this method is a Moving Least Squares approximation that reproduces polynomials of degree $\leq d$ in s variables.



Time: 2 hours.