

# INTERPOLATION AND APPROXIMATION IN SEVERAL VARIABLES

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## Abstract

Let  $X$  be our favorite Banach space of continuous functions on  $\mathbb{R}^n$  (e.g.  $C^m$ ,  $C^{m,\alpha}$ ,  $W^{m,p}$ ). Given a real-valued function  $f$  defined on an (arbitrary) given set  $E$  in  $\mathbb{R}^n$ , we ask: How can we decide whether  $f$  extends to a function  $F$  in  $X$ ? If such an  $F$  exists, then how small can we take its norm? What can we say about the derivatives of  $F$ ? Can we take  $F$  to depend linearly on  $f$ ?

What if the set  $E$  is finite? Can we compute an  $F$  whose norm in  $X$  has the smallest possible order of magnitude? How many computer operations does it take? What if we ask only that  $F$  agree approximately with  $f$  on  $E$ ? What if we are allowed to discard a few points of  $E$  as "outliers"; which points should we discard?

A fundamental starting point for the above is the classical Whitney extension theorem.

The results are joint work with Arie Israel, Bo'az Klartag, Garving (Kevin) Luli, and Pavel Shvartsman.