

Some Notes on Function Spaces

Jonathan Zhang

1 Preliminaries

2 Lebesgue Spaces

3 Distributions

4 Sobolev Spaces

Theorem 4.1. *Here, we use the following notation: $(M^\alpha f)(x) = x^\alpha f(x)$. If $T \in S'$ and $f \in S$, then $T * f$ is smooth and polynomially bounded.*

Things to revisit:

- Prop. 6.14: If p is a polynomial, $g \in \mathcal{S}$, and α a multiindex, then the maps $f \mapsto pf$, $f \mapsto gf$, and $f \mapsto D^\alpha f$ are continuous maps from \mathcal{S} into itself.
- Prop 6.15: If $f_j \rightarrow f$ in \mathcal{S} , then $f_j \rightarrow f$ in L^p for $1 \leq p \leq \infty$.