MATH 9133 WINTER 2019

HOMEWORK ASSIGNMENT 3. DUE MARCH 14.

3.1. Find the "area" of S^{n-1}, i.e., the $n-1$-dimensional volume of the unit sphere in $\mathbb{R}^n$ for general n.

3.2. Prove for $1 \leq p \leq \infty$ that the space L^p with the topology given by the norm $||\cdot||_p$ is a topological vector space.

3.3. Suppose that a function ϕ is real analytic on $\mathbb{R}^n$ and is a test function. Prove that $\phi \equiv 0$.

3.4. Suppose that $\phi \in \mathcal{D}(\Omega)$ for a domain $\Omega \subset \mathbb{R}^n$. Let $K = \operatorname{supp} \phi$. Determine $\operatorname{supp} \phi_\epsilon$, where ϕ_ϵ is the regularization of ϕ.