DIFFERENTIAL GEOMETRY 88-826 HOMEWORK SET 3

Due Date: 11 may '22

1. Compute the Euclidean norm $|\alpha|$ and the comass $\|\alpha\|$ of the 2-form $\alpha = e_1 \wedge e_2 + e_1 \wedge e_3 + \cdots + e_1 \wedge e_n$ on $\mathbb{R}^n$.

2. Consider the Eisenstein lattice $L_E \subseteq \mathbb{C}$ spanned by the cube roots of unity. Let L_E^* be its dual lattice. Calculate the product $\lambda_1(L_E^*)\lambda_1(L_E)$.

3. Let $M = \{z \in \mathbb{C} : (|z|^2 - 1)(|z - 3|^2 - 1) = 0\}$. Compute the de Rham cohomology group $H^0_{dR}(M)$.

4. Let M be the manifold of problem 3. Compute the de Rham cohomology group $H^1_{dR}(M)$.