

Homework #6 of Topology II

Due Date: April 11, 2018

1. (Bott&Tu, Page 17) Show that the long exact sequence of cohomology groups exists and is exact.
2. (Bott&Tu, Page 19) Compute $H_{DR}^*(\mathbb{R}^2 - P - Q)$, where P and Q are two points in \mathbb{R}^2 . Find the closed forms that represents the cohomology classes.
3. (Bott&Tu, Page 20) Show that if $\omega = \sum g_I du_I$, then $d\omega = \sum dg_I du_I$.
4. A change of coordinate is given by a diffeomorphism $T : \mathbb{R}^n \rightarrow \mathbb{R}^n$ with coordinates y_1, y_2, \dots, y_n and x_1, x_2, \dots, x_n respectively:

$$x_i = x_i \circ T(y_1, y_2, \dots, y_n).$$

Show that $dT_1 \cdots dT_n = J(T) dy_1 \cdots dy_n$, where $J(T) = \det(\partial x_i / \partial y_j)$ is the Jacobian determinant of T .

5. Prove the Stokes' theorem for the upper half space.