

HOMEWORK 3

1. From [RB]: 1.7, (4.3 and 4.3.1)*, 4.8*
- 2*. Suppose M and N are smooth manifolds. Prove that

$$H_{\text{dR}}^1(M \times N) \cong H_{\text{dR}}^1(M) \oplus H_{\text{dR}}^1(N)$$

- 3*. Let $S^{n-1} \subset \mathbb{R}^n$ be the unit sphere. Consider the $(n-1)$ -form ω on S^{n-1} given by

$$\omega = \sum_{i=1}^n (-1)^{i+1} x^i dx^1 \wedge \cdots \wedge \widehat{dx^i} \wedge \cdots \wedge dx^n$$

Use Stokes Theorem and compute

$$\int_{S^{n-1}} \omega.$$

REFERENCES

[RB] Loring W. Tu Raoul Bott, *Differential forms in algebraic topology*, Springer New York, NY.