

## Homework 2

### Geometrical methods in theoretical physics HT-11

1. Give two explicit examples of free action of Lie group on smooth manifold.
2. Give two explicit examples of transitive action of Lie group on smooth manifold
3. Consider a Riemannian compact manifold and define Laplace operator

$$\Delta = d^\dagger d + dd^\dagger$$

on differential forms. Are there negative eigenvalues for  $\Delta$ ? Explain the answer.

**to be handed in before 5 p.m., January 15, 2012**