Lie algebras and representation theory/Fall 2013 **Problem set 3**

To be returned on Wednesday, September 25, 10.15am at latest

1. Find all characters of irreducible representations of the cyclic group C_n (which consists of powers of $e^{\cdot 2\pi i/n}$).

2. Find all conjugacy classes in the dihedral group D_n. (See the problems 1/2 and 4/2.)

3. Let G be the group of all invertible real $n \times n$ matrices A such that $A_{ij} = 0$ for $i > j$ and $A_{ii} = 1$. Define a left invariant integration on G. Hint: Try first $n = 2, 3$. You just need to use the standard invariance properties of integration in an Euclidean space $\mathbb{R}^k$. Is the integral also right invariant?

4. On the bases of the exercise 2 we know the number of inequivalent irreducible representations of D_n. Find first all 1-dimensional representations. It turns out that the rest of the irreps are 2-dimensional; try to construct some of them. Compare with the number of conjugacy classes in D_n! It turns out to be useful to separate the cases n even and n odd.