Solution to Problems

1. All positive real numbers form a group with respect to ordinary multiplication.

2. All complex numbers form a group with respect to ordinary addition.

3. Let a and b be two different group elements such that $a \cdot c = d$ and $b \cdot c = d$. Let us multiply these two equations by c^{-1} from the left: $a = d \cdot c^{-1}$ and $b = d \cdot c^{-1}$. Thus we have then the elements $a = b$ and our initial suppose was incorrect. Therefore, in one line of the multiplication table there cannot be two equal group elements.

4. The symmetry groups of the molecules: H_2O: $\mathbf{C}_{2v}$, NH_3: $\mathbf{C}_{3v}$, CH_4: $\mathbf{T}_d$, UF_6: $\mathbf{O}_h$.

5. The multiplication table for the point symmetry group $\mathbf{C}_4$:

	E	C_4	C_2	C_4^3
E	E	C_4	C_2	C_4^3
C_4	C_4	C_2	C_4^3	E
C_2	C_2	C_4^3	E	C_4
C_4^3	C_4^3	E	C_4	C_2

6.

7. Hint: check the corresponding boxes of the multiplication table.

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9. Hint: from the equations (i) (10) and (ii) (14) get the corresponding relations between parameters.

10. Hint: check that the group postulates are satisfied.

11. Among the elements there is no identity element.

12. $n(n-1)/2$ parameters.

13. Hint: show that $x'^2 - y'^2 = x^2 - y^2$.