Midterm 1, Theoretical questions
November 10, 41 points in 5 questions

Name and the student number:

Q1. (16 pts)
(1) What is called “a symplectic linear form” in $\mathbb{R}^{2n}$?

(2) Give a formula for the standard symplectic form in $\mathbb{R}^{2n}$.

(3) Give a formula relating the inner product, the complex structure and the symplectic form in $\mathbb{R}^{2n}$.

(4) Give a formula relating the Hermitian form in $\mathbb{C}^{n}$ with the inner product and the symplectic form.

(5) What does say the Darboux theorem?

(6) Formulate Cartan’s formula.

(7) What is a contact form?

(8) What is Reeb’s vector field?
Q2. (5 pts) Define the tautological and canonical forms on the cotangent bundle.

Q3. (5 pts) State the Liouville Theorem. Derive it from Cartan’s formula.

Q4. (5 pts) Describe the symplectization of a contact manifold and contactization of a symplectic manifold.
Q5. (10 pts) Give definitions of (a) strongly and (b) weakly fillable contact manifold. (State two equivalent conditions for each of the definitions).