Additional Practise Sheet: Functional Analysis   Completely voluntary.

If you want, we can discuss your solutions in the **Final Question Time of the semster**.
No extra points are awarded – the values are only meant as grade of difficulty here.

1. DIRAC'S δ-DISTRIBUTION (**9P**): Prove all of its properties on the handout.

2. FOURIER TRANSORMS (**9P**): Prove all of its properties on the handout.

3. (**3P**) Consider a Gaussian, $f(x) = \exp{-x^2/(2\sigma_x^2)}$, with width σ_x. When you calculate its Fourier transform, you will find that you get another Gaussian in momentum space, but with a different width σ_k. What is it? Make a connection to HEISENBERG'S UNCERTAINTY RELATION when you interpret $f(x)$ as a wave-packet in coordinate space.