

Exercise Sheet 6
Advanced Quantum Theory
WS 2010/11

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Exercise 1:

(3 points)

Let f be a positive functional on the $*$ -algebra \mathcal{A} .
Show that

(i) $f(a^*b) = \overline{f(b^*a)}$

(ii) $|f(a^*b)|^2 \leq f(a^*a)f(b^*b)$ for all $a, b \in \mathcal{A}$

(see II.2.20.1)

Exercise 2:

(3 points)

Prove II.3.19,ii), i.e. prove that $\text{tr}(U^{-1}mU) = \text{tr}(m)$ for unitary U .

Exercise 3:

(3 points)

Prove that a state w is pure if and only if every positive functional w_1 with $w_1 \leq w$ is of the form $w_1 = \lambda w$ for some $\lambda \in (0, 1]$.