

FUN theory topics for final exam

- (1) State and prove Hölder's inequality.
- (2) Show that a linear operator is bounded if and only if it is continuous.
- (3) Show that the dual of  $l^p$  is  $l^q$ .
- (4) State and prove the Riesz representation theorem for functionals on Hilbert spaces.
- (5) State and prove the Uniform Boundedness Principle.
- (6) State and prove the Closed Graph Theorem.
- (7) Prove that the spectrum of a bounded linear operator on a complex Banach space is compact.
- (8) Prove that a bounded linear operator on a Hilbert space is an orthogonal projection if and only if it is self-adjoint and idempotent.