

## Homework 2, Math 509 Spring 2018

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- 1:** Show that the finite rank operators  $\mathcal{F}$  are dense in  $\mathcal{B}(\mathcal{H})$  when it is equipped with the  $\sigma$ -weak topology.
- 4:** . Show that any non-zero ideal  $\mathcal{I}$  (two-sided, as always) in  $\mathcal{B}(\mathcal{H})$  contains all of  $\mathcal{F}$ .
- 3:** Let  $\pi$  be a  $*$ -homomorphism from  $\mathcal{B}(\mathcal{H})$  to  $\mathcal{B}(\mathcal{K})$  for some other Hilbert space  $\mathcal{K}$ . Show that if  $\pi$  is non-zero, and is  $\sigma$ -weakly continuous, it is an isometric isomorphism of  $\mathcal{B}(\mathcal{H})$  into  $\mathcal{B}(\mathcal{K})$ , but that this need not be true if we do not assume the  $\sigma$ -weak continuity.

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