

Homework 1 - Approximate representation theory (pmath 945)

Please hand in homework by email on Wednesday, September 18th.

- (1) Show that

$$\mathbb{C}\langle x, y : xy - yx = 1 \rangle$$

has no bounded representations on Hilbert space.

Alternative: Show that the algebra

$$\mathbb{C}\langle x, y : xy - yx = i, x^* = x, y^* = y \rangle$$

has no bounded representations.

- (2) Show that  $\mathbb{C}Z_n$  and

$$\mathbb{C}^*\langle p_1, \dots, p_n : p_i^* = p_i = p_i^2 \text{ for all } 1 \leq i \leq n, p_i p_j = 0 \text{ if } i \neq j, \sum_{i=1}^n p_i = \mathbb{1} \rangle$$

are isomorphic \*-algebras.

- (3) An exercise from this week's lecture / lecture notes of your choice.