

Non-commutative Algebra, WS 19/20

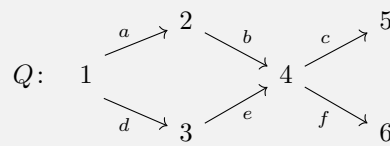
Lectures: W. Crawley-Boevey

Exercises: A. Hubery

Exercises 9

- The following question appeared on Exercise Sheet 11 last semester:

Consider the algebra $A := KQ/I$ for the quiver



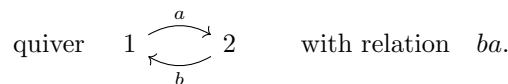
and admissible ideal $I = (ba - ed, cb, fe)$.

- Compute the indecomposable projectives $P[i]$ and their radicals.
- Compute the indecomposable injectives $I[i]$ and their quotients $I[i]/S[i]$.
- Compute the minimal projective resolutions of the simple modules.
- Compute the minimal injective resolutions of the projective modules.

Use your answer to compute $\text{gl. dim } A$ and $\text{dom. dim } A$.

Find all indecomposable projective-injectives, and compute the endomorphism algebra of their direct sum.

- Let B be the Nakayama algebra given via



Compute the Auslander algebra of B , so the algebra $E := \text{End}_B(M)$ where M is the direct sum of a representative set of indecomposable B -modules. Compute the indecomposable projective E -modules and the indecomposable injective E -modules, and compute $\text{dom. dim } E$.

- Prove properties (3) and (4) of the trace function, used in the proof of the no loops conjecture.

To be handed in by 7th January.