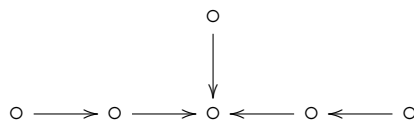


13. Übungsaufgaben Darstellungstheorie I, WS 06/07

1. Let Q be a quiver. Show that the radical $J(KQ)$ has as a basis the set of all paths from i to j such that there is no path from j to i , where i and j run through the set of vertices of Q .

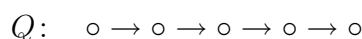
2. Construct an indecomposable representation of the quiver



with dimension vector

$$\begin{array}{ccccccc}
 & & & 1 & & & \\
 1 & 2 & 3 & 2 & 1 & &
 \end{array}$$

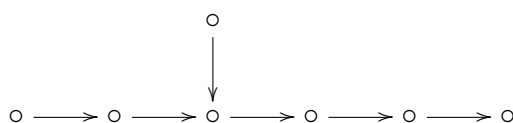
3. Show: If $V = (V_i, V_a)_{i \in Q_0, a \in Q_1}$ is an indecomposable representation of the quiver



then $\dim V_i \leq 1$ for all $i \in Q_0$.

Construct the Auslander-Reiten quiver of Q .

4. Let Q be the following quiver:



Let $A = KQ$. Write ${}_A A$ as a direct sum of indecomposable representations and compute the dimension of the indecomposable direct summands.

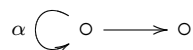
5. Let

$$A = \begin{bmatrix} K[T]/(T^2) & 0 \\ K[T]/(T^2) & K \end{bmatrix}.$$

This gives a K -algebra via the usual matrix multiplication. (The elements of A are of the form

$$\begin{bmatrix} a & 0 \\ b & c \end{bmatrix}$$

where $a, b \in K[T]/(T^2)$ and $c \in K$.) Show that A is isomorphic to KQ/I where Q is the quiver



and I is the ideal in KQ generated by the path $\alpha^2 := (\alpha, \alpha)$.