Auslander-Reiten quivers of pathalgebras

Let Q be a connected quiver without loops or oriented cycles, and $A := kQ$.
Recall: A is hereditary and there are no morphisms from non-projective to projective or injective to non-injective indecomposable modules.

Exercise (a): Let X, Y be indecomposable, not projective. Show that

$$\mathrm{Hom}_A(X,Y) = \underline{\mathrm{Hom}}_A(X,Y)$$

and $\mathrm{Hom}_A(X,Y) \simeq \mathrm{Hom}_A(\tau X, \tau Y)$

(and similarly for $\overline{\mathrm{Hom}}$ and τ^{-1}).

An indecomposable A-module M is called

preprojective $:\Leftrightarrow \exists P$ indecomposable projective, $n \in \mathbb{N}_0$ such that $M = \tau^{-n} P$

preinjective $:\Leftrightarrow \exists I$ indecomposable injective, $n \in \mathbb{N}_0$ such that $M = \tau^{n} I$

regular $:\Leftrightarrow$ M is neither preprojective nor preinjective

Exercise (b): Show that all indecomposable projective modules are in the same AR component, and similarly for injective.

Exercise (c): Prove that the preprojective modules are in the same AR-component, and this AR-component only contains preprojective modules. Similarly for preinjective.
Deduce that A has finite representation type if and only if all modules are preprojective.

Suppose A has infinite representation type. Let $\mathcal{P}$ be the preprojective component, $\mathcal{I}$ the preinjective and $\mathcal{R}$ the union of the regular components.

Exercise (d): Prove that $X \notin \mathcal{P}, Y \in \mathcal{P} \Rightarrow \mathrm{Hom}_A(X,Y) = 0$

$X \in \mathcal{I}, Y \notin \mathcal{I} \Rightarrow \mathrm{Hom}_A(X,Y) = 0$

$\mathcal{P} \cap \mathcal{I} = \emptyset$