HW3

September 28, 2020

1. Let $Q = (Q_0, Q_1, h, t)$ be a quiver $Q = (1 \xrightarrow{a} 2 \xrightarrow{b} 3)$. Consider the following representations:
$P = (0 \xrightarrow{0} \mathbb{C} \xrightarrow{[1]} \mathbb{C})$
$Q = (\mathbb{C} \xrightarrow{[1]} \mathbb{C} \xrightarrow{[5]} \mathbb{C})$
$S_2 = (0 \xrightarrow{0} \mathbb{C} \xrightarrow{0} 0)$
$I = (\mathbb{C} \xrightarrow{[1]} \mathbb{C} \xrightarrow{0} 0)$

   (a) Define representation morphisms $g : P \to Q \oplus S_2$ and $f : Q \oplus S_2 \to I$ such that
   $$0 \longrightarrow P \xrightarrow{g} Q \oplus S_2 \xrightarrow{f} I \longrightarrow 0$$
   is a short exact sequence.

   (b) Remember to prove that g and f are representation morphism.

   (c) Prove that the sequence is exact.

2. Let Λ be a finite dimensional $\mathbb{C}$-algebra. Let $0 \longrightarrow A \xrightarrow{g} B \xrightarrow{f} C \longrightarrow 0$ be a short exact sequence of left Λ-modules. Prove that (f is split epi) $\iff$ (g is split mono).