

$$\begin{array}{ccc}
 \mathrm{Hom}(P, I) & \longleftarrow & \mathrm{Hom}(A, I) \\
 \uparrow & & \text{with the both being quasi-isomorphisms because } P \text{ is K-projective and } I \text{ is K-injective.} \\
 \mathrm{Hom}(P, B) & & 
 \end{array}$$