exact sequences

definition

Let A be a ring. A diagram of A-modules homomorphisms

$$M' \to M \to M'', \tag{1}$$

for A-modules M, M', and M'', is called exact, if

$$\ker(M \to M'') = \mathrm{im}(M' \to M).$$

One can also say that the sequence (1) is exact in the middle.

A short exact sequence refers to a diagram

$$0 \to M' \to M \to M'' \to 0 \tag{2}$$

which is exact at M', M, and M''. That is to say, all subseuqences

$$\begin{aligned} 0 \to & M' \to M \\ M' \to & M \to M'' \\ M \to & M'' \to 0 \end{aligned}$$

are exact.
One can also say that the sequence (2) is exact.

A long exact sequence refers to a diagram

$$\cdots \to M_{n-1} \to M_n \to M_{n+1} \to \cdots \tag{3}$$

which is exact at each M_i's.

One can also say that the sequence (3) is exact.

Question

For an exact sequence

$$0 \to M' \to M \to M'' \to 0 \tag{4}$$

show that the map $M \to M''$ is the cokernel of the map $M' \to M$ in terms of the universal properties.