

Whenever we can reduce a computation to looking at some exact sequence,  
life is beautiful!

### Most important ideas

- $A \xrightarrow{f} B \xrightarrow{g} C$  exact  $\Leftrightarrow \text{im } f = \text{ker } g$
- $0 \rightarrow A \xrightarrow{f} B$  exact  $\Leftrightarrow f$  injective
- $A \xrightarrow{f} B \rightarrow 0$  exact  $\Leftrightarrow f$  surjective
- $0 \rightarrow A \xrightarrow{f} B \rightarrow 0$  exact  $\Leftrightarrow f$  isomorphism
- $0 \rightarrow A \rightarrow 0$  exact  $\Leftrightarrow A = 0$
- $0 \rightarrow A \rightarrow B \xrightarrow{f} C$  exact  $\Leftrightarrow A = \text{ker } f$
- $A \xrightarrow{f} B \rightarrow C \rightarrow 0$  exact  $\Leftrightarrow C = \text{coker } f$