

Method 1: Using package `xy`

$$\begin{array}{ccccccc}
 \rightarrow H^{k+1}(M) & \xrightarrow{i^*} & \dots & & & & \\
 & \searrow d^* & & & & & \\
 \rightarrow H^k(M) & \xrightarrow{i^*} & H^k(U) \oplus H^k(V) & \xrightarrow{j^*} & H^k(U \cap V) & & \\
 & \searrow d^* & & & & & \\
 & & \dots & \xrightarrow{j^*} & H^{k-1}(U \cap V) & &
 \end{array}$$

Method 2: Using package `tikz-cd`

$$\begin{array}{ccccccc}
 \rightarrow H^{k+1}(M) & \xrightarrow{i^*} & \dots & & & & \\
 & \searrow d^* & & & & & \\
 \rightarrow H^k(M) & \xrightarrow{i^*} & H^k(U) \oplus H^k(V) & \xrightarrow{j^*} & H^k(U \cap V) & & \\
 & \searrow d^* & & & & & \\
 & & \dots & \xrightarrow{j^*} & H^{k-1}(U \cap V) & &
 \end{array}$$

Method 3: Using package `tikz`

$$\begin{array}{ccccccc}
 \rightarrow H^{k+1}(M) & \xrightarrow{i^*} & \dots & & & & \\
 & \searrow d^* & & & & & \\
 \rightarrow H^k(M) & \xrightarrow{i^*} & H^k(U) \oplus H^k(V) & \xrightarrow{j^*} & H^k(U \cap V) & & \\
 & \searrow d^* & & & & & \\
 & & \dots & \xrightarrow{j^*} & H^{k-1}(U \cap V) & &
 \end{array}$$