

June 19, 2018

$$\begin{array}{ccc}
 V & \xrightarrow{f} & W \\
 \searrow & & \swarrow \tilde{f} \\
 & \pi_U & \\
 & V/U &
 \end{array}$$

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$$\begin{array}{ccc}
 V & \xrightarrow{f} & W \\
 \searrow & & \downarrow \phi \\
 & f^*(\phi) & K
 \end{array}$$

$$V^* \xleftarrow{f^*} W^*$$

$$\begin{array}{ccc}
 V & \xrightarrow{f} & W \\
 \downarrow \iota_V \cong & & \downarrow \iota_W \cong \\
 V^{**} & \xrightarrow{f^{**}} & W^{**}
 \end{array}$$

