

Step 2

$$\begin{array}{ccccc}
 & S^0 \wedge S^0 & \xrightarrow{\text{id}_{\text{Sets}_*|S^0, S^0}^{\otimes, -1}} & S^0 \otimes_{\text{Sets}_*} S^0 & \xrightarrow{S^0 \text{id}_{S^0} \wedge \text{id}_{\mathbb{1}/\text{Sets}_*}^{\otimes, -1}} \\
 \nearrow \rho_{S^0}^{\text{Sets}_*, -1} & \downarrow & \text{(\text{2})} & \downarrow & \\
 S^0 & \xrightarrow{\rho_{S^0}^{\prime, -1}} & S^0 \otimes_{\text{Sets}_*} \mathbb{1}_{\text{Sets}_*} & & \\
 \downarrow [x] & \downarrow [x] \wedge \text{id}_{S^0} & \text{(1)} & \downarrow [x] \otimes_{\text{Sets}_*} \text{id}_{S^0} & \downarrow [x] \wedge \text{id}_{\mathbb{1}/\text{Sets}_*} \\
 & \downarrow & \text{(5)} & \downarrow & \\
 & X \wedge S^0 & \xrightarrow{\text{id}_{\text{Sets}_*|X, S^0}^{\otimes, -1}} & X \otimes_{\text{Sets}_*} S^0 & \xrightarrow{-\text{id}_X \wedge \text{id}_{\mathbb{1}/\text{Sets}_*}^{\otimes, -1}} \\
 \nearrow \rho_X^{\text{Sets}_*, -1} & \downarrow & \text{(\text{2})} & \downarrow & \\
 X & \xrightarrow{\rho_X^{\prime, -1}} & X \otimes_{\text{Sets}_*} \mathbb{1}_{\text{Sets}_*} & & \\
 \downarrow [x] & & & & \\
 & & & &
 \end{array}$$

(3) (4) (5)