

$$\int_{dz}^Z \overline{\mathcal{L}(C)}$$

$$Z = X \times Y$$

$$C(x:y) = A(x) \wedge B(y)$$

$$\overline{\mathcal{L}(C)}^{x:y} = \overline{\mathcal{L}_X(A)}^x \overline{\mathcal{L}_Y(B)}^y$$

$$\int_{dx dy}^{X \times Y} \overline{\mathcal{L}(C)}^{x:y} = \int_{dx dy}^{X \times Y} \overline{\mathcal{L}_X(A)}^x \overline{\mathcal{L}_Y(B)}^y = \int_{dx}^X \overline{\mathcal{L}_X(A)}^x \int_{dy}^Y \overline{\mathcal{L}_Y(B)}^y$$