

$$\int_0^1 \int_0^1 x \cdot y \cdot (x + y) dx dy \quad (1)$$

$$: \frac{1}{3}$$

$$\int_0^1 \int_0^1 x \cdot (x + y) dx dy \quad (2)$$

$$: \frac{7}{12}$$

$$\frac{1}{3} - \left(\frac{7}{12}\right)^2 \quad (3)$$

$$: -\frac{1}{144}$$

$$V[X] = \int_0^1 \int_0^1 \left(x - \frac{7}{12}\right)^2 \cdot (x + y) dx dy = \frac{11}{144} \quad (4)$$

$$V[Y] = \int_0^1 \int_0^1 \left(y - \frac{7}{12}\right)^2 \cdot (x + y) dx dy = \frac{11}{144} \quad (5)$$

$$\sigma_X = \sigma_Y = \sqrt{\frac{11}{144}} \quad (6)$$

$$\rho_{X,Y} = \frac{Cov[X,Y]}{\sigma_X \sigma_Y} = \frac{-1}{144 \cdot \sqrt{\frac{11}{144}} \cdot \sqrt{\frac{11}{144}}} = -1/11 \quad (7)$$

$$-1/11 = -9.0909 \times 10^{-2} \simeq -10\%$$