

$$1. \Phi(r, s) = (rs, r+s)$$

$$\frac{dx}{dr} = s, \quad \frac{dx}{ds} = r, \quad \frac{dy}{dr} = \cancel{1}, \quad \frac{dy}{ds} = \cancel{1}$$

$$J = \frac{d(x, y)}{d(r, s)} = \begin{vmatrix} s & r \\ \cancel{1} & \cancel{1} \end{vmatrix} = s(\cancel{1}) - r(\cancel{1})$$

$$= s - r$$

$$= s - r$$

$$2. \Phi(u, v) = (u+v, v^2)$$

$$\frac{dx}{du} = 1, \quad \frac{dx}{dv} = 1, \quad \frac{dy}{du} = 0, \quad \frac{dy}{dv} = 2v$$

$$J = \begin{vmatrix} 1 & 1 \\ 0 & 2v \end{vmatrix} = 2v$$

$$u+v=0, \quad v^2=6$$

$$u=-\sqrt{6}, \quad v=\sqrt{6}$$

$$u+v=1, \quad v^2=2$$

$$u=1-\sqrt{2}, \quad v=\sqrt{2}$$

$$\int \int v^2 \cdot 2v$$

$$1-\sqrt{2} \quad \sqrt{6}$$

$$2 \int \int v^3 \, dv \, du$$

$$-\sqrt{6} \quad \sqrt{2}$$

$$= 16(1-\sqrt{2}+\sqrt{6})$$

