$$J = \begin{bmatrix} \partial f_x/\partial x & \partial f_x/\partial y \\ \partial f_y/\partial x & \partial f_y/\partial y \end{bmatrix}$$

$$\rightarrow \partial/\partial x \begin{pmatrix} F_1 \\ f_2 \\ f_3 \end{pmatrix} \partial/\partial y \begin{pmatrix} f_1 \\ f_2 \\ f_3 \end{pmatrix} \begin{pmatrix} f_1 \\ f_2 \\ f_3 \end{pmatrix} \partial/\partial z$$