A Jacobian is similar to a gradient but for a vector of functions (it is therefore a vector of gradients).

$$f(x,y) = 3x^2y$$
$$g(x,y) = 2x + y^8$$
$$\mathbf{J} = \begin{bmatrix} \nabla f(x,y) \\ \nabla g(x,y) \end{bmatrix} = \begin{bmatrix} \frac{\partial f(x,y)}{\partial x} & \frac{\partial f(x,y)}{\partial y} \\ \frac{\partial g(x,y)}{\partial x} & \frac{\partial g(x,y)}{\partial y} \end{bmatrix} = \begin{bmatrix} 6yx & 3x^2 \\ 2 & 8y^7 \end{bmatrix}$$

NOTE Notation used is the ”numerator layout” although many use denominator layout which is tranposed. $\begin{bmatrix} 6yx & 2 \\ 3x^2 & 8y^7 \end{bmatrix}$ vs $\begin{bmatrix} 6yx & 3x^2 \\ 2 & 8y^7 \end{bmatrix}$

1 | Further Sources

See here for videos and here for good sources.