0.3

Para el borde derecho

$$v_x = \frac{\partial u}{\partial y} = 0$$

$$v_y = 0 \quad , \quad \frac{d v_y}{dx} = 0$$

$$\omega_{der} = \cancelto{0}{\frac{\partial v_y}{\partial x}} - \frac{\partial v_x}{\partial y} = -\frac{\partial^2 u}{\partial y^2}$$

Reemplazando en la serie de Taylor.

$$u(x, y+h) = u(x,y) + \cancelto{0}{\frac{\partial u}{\partial y}} h + \frac{1}{2} \cancelto{-\omega_{der}}{\frac{\partial^2 u}{\partial y^2}} h^2 + \dots$$

$$u(x, y+h) = u(x,y) - \frac{\omega_{der}}{2} h^2$$

$$-2 \, \frac{u(x, y+h) - u(x,y)}{h^2} = \omega_{der}$$

Con diferenciales infinitos

$$\omega_{der} = -2\,\frac{u_{i,j+1} - u_{i,j}}{h^2}$$

Para el borde izquierdo

$$u_x = \frac{\partial u}{\partial y} = 0$$

$$v_y = 0 \quad , \quad \frac{d v_x}{dx} = 0$$

$$\omega_{izq} = \cancelto{0}{\frac{\partial v_y}{\partial x}} - \frac{\partial u_x}{\partial y} = -\frac{\partial^2 u}{\partial y^2}$$

Reemplazando en la serie de Taylor.

$$u(x, y-h) = u(x,y) - \cancelto{0}{\frac{\partial u}{\partial y}}\, h + \frac{1}{2}\cancelto{-\omega_{izq}}{\frac{\partial^2 u}{\partial y^2}}\, h^2 + \dots$$

$$u(x, y-h) = u(x,y) - \frac{\omega_{izq}}{2} h^2$$

$$-2 \, \frac{u(x, y-h) - u(x,y)}{h^2} = \omega_{izq}$$

Con diferenciales infinitos

$$\omega_{izq} = -2 \, \frac{u_{i,j-1} - u_{i,j}}{h^2}$$