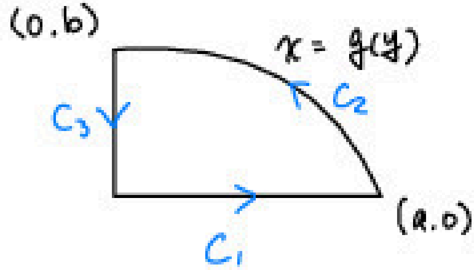
Normal form:



$$\iint_R \left(\frac{\partial M}{\partial x}+\frac{\partial N}{\partial y}\right)dx\,dy$$

$$=\int_0^b\int_0^{g(y)} \frac{\partial M}{\partial x}\,dx\,dy$$

$$=\int_0^b \big(M(g(y),y)-M(0,y)\big)\,dy$$

$$=\int_0^b M(g(y),y)\,dy-\int_0^b M(0,y)\,dy$$

$$C_1: \begin{cases} x=t \\ \boxed{y=0} \end{cases} \quad 0\le t\le a$$

$$C_2: \begin{cases} x=g(t) \\ y=t \end{cases} \quad 0\le t\le b$$

$$C_3: \begin{cases} x=0 \\ y=b-t \end{cases} \quad 0\le t\le b$$

$$\oint_C M\,dy - N\,dx$$

$$=\cancelto{0}{\oint_{C_1} M\,dy} + \oint_{C_2} M\,dy + \oint_{C_3} M\,dy$$

$$=\int_0^b M(g(t),t)\,dt + \int_0^b M(0,b-t)(-dt)$$

let $y=b-t$
$dy=-dt$

$$=\int_0^b M(g(t),t)\,dt + \int_b^0 M(0,y)\,dy$$

$$=\int_0^b M(g(y),y)\,dt - \int_0^b M(0,y)\,dy$$

$$\therefore \iint_R \left(\frac{\partial M}{\partial x}+\frac{\partial N}{\partial y}\right)dx\,dy = \oint_C M\,dy - N\,dx$$