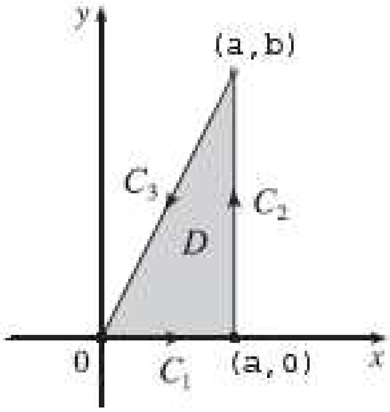

$a = 2$
$b = 6$

(a) $C_1\colon\ x = t \ \Rightarrow\ dx = dt,\ y = 0 \ \Rightarrow\ dy = 0\,dt,\ 0 \le t \le 2.$

$C_2\colon\ x = 2 \ \Rightarrow\ dx = 0\,dt,\ y = t \ \Rightarrow\ dy = dt,\ 0 \le t \le 6.$

$C_3\colon\ x = 2 - t \ \Rightarrow\ dx = -dt,\ y = 6 - 3t \ \Rightarrow\ dy = -3\,dt,$
$0 \le t \le 2.$

Thus

$$\begin{aligned}
\oint_C xy\,dx + x^2y^3\,dy &= \oint_{C_1+C_2+C_3} xy\,dx + x^2y^3\,dy \\
&= \int_0^2 0\,dt + \int_0^6 4t^3\,dt \\
&+ \int_0^2 \left[-(2-t)(6-3t) - 3(2-t)^2(6-3t)^3\right] dt \\
&= 0 + \left[t^4\right]_0^6 + \left[(2-t)^3 + \tfrac{27}{2}(2-t)^6\right]_0^2 \\
&= 1296 - 872 = 424
\end{aligned}$$

(b)
$$\begin{aligned}
\oint_C xy\,dx + x^2y^3\,dy &= \iint_D \left[\frac{\partial}{\partial x}(x^2y^3) - \frac{\partial}{\partial y}(xy)\right] dA \\
&= \int_0^2 \int_0^{3x} (2xy^3 - x)\,dy\,dx = \int_0^2 \left[\tfrac{1}{2}xy^4 - xy\right]_{y=0}^{y=3x} dx \\
&= \int_0^2 \left(\tfrac{81}{2}x^5 - 3x^2\right) dx = 432 - 8 = 424
\end{aligned}$$