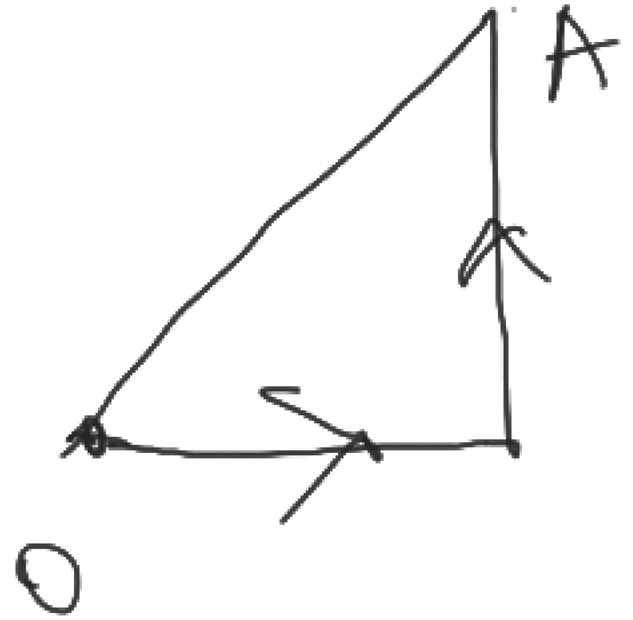
P1.

$C_1 : y = 2x$ $\quad (0,0)$ to $(1,2)$

$\qquad\qquad\qquad\quad O \qquad\quad A$



$C_2 : y = 2x^2$

$C_3 : y = 0$ from $(0,0)$ to $(1,0)$ and

Home Work

$x = 1$ from $(1,0)$ to $(1,2)$

along each path find $\int \vec{F} \cdot \vec{dr}$

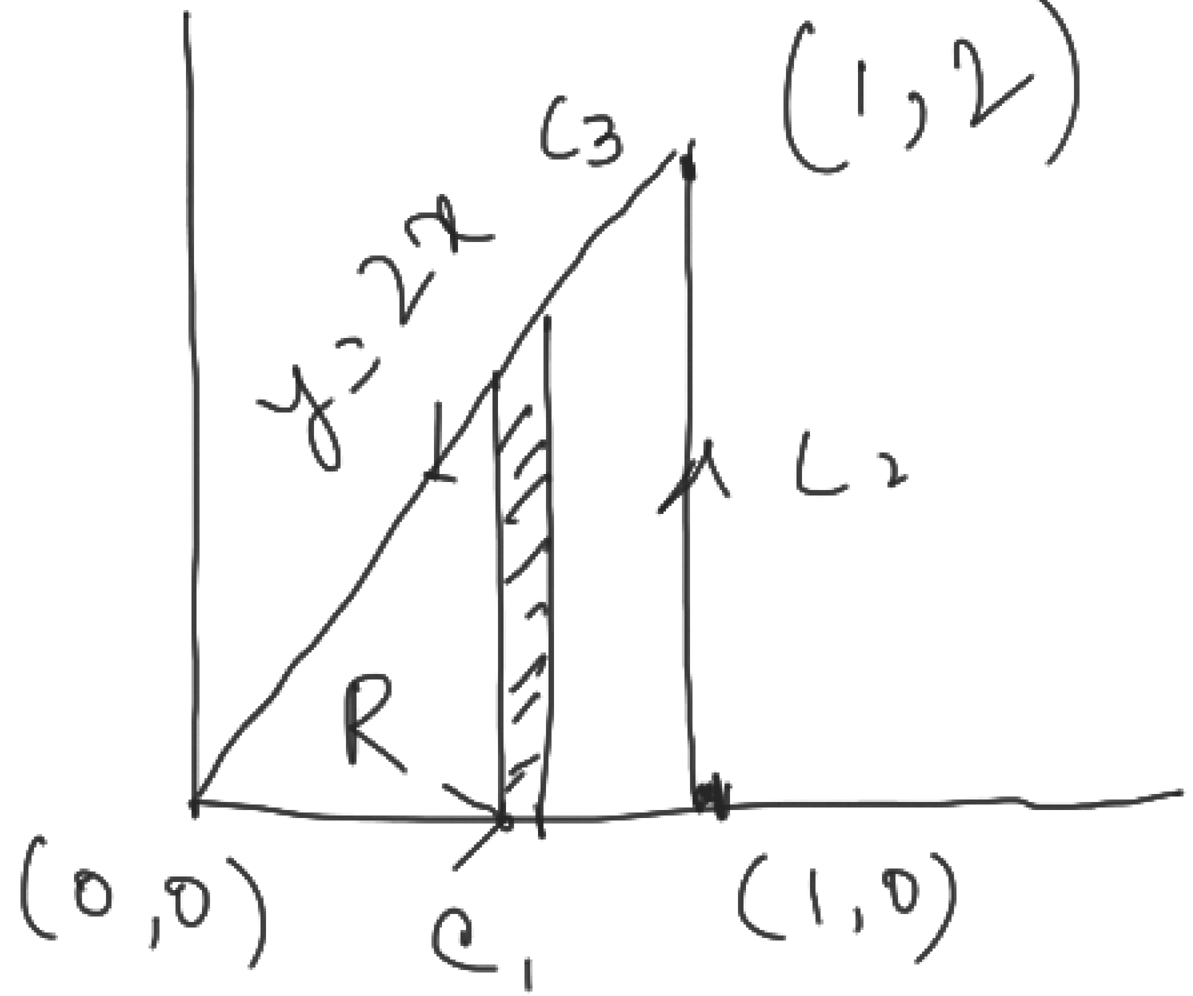
$\vec{F} = y^2 i + xy j$

Ex. Evaluate $\oint_C xy\,dx + x^2y^3\,dy$, where C is the curve that is the boundary of the triangle having vertices $(0,0)$, $(1,0)$, $(1,2)$

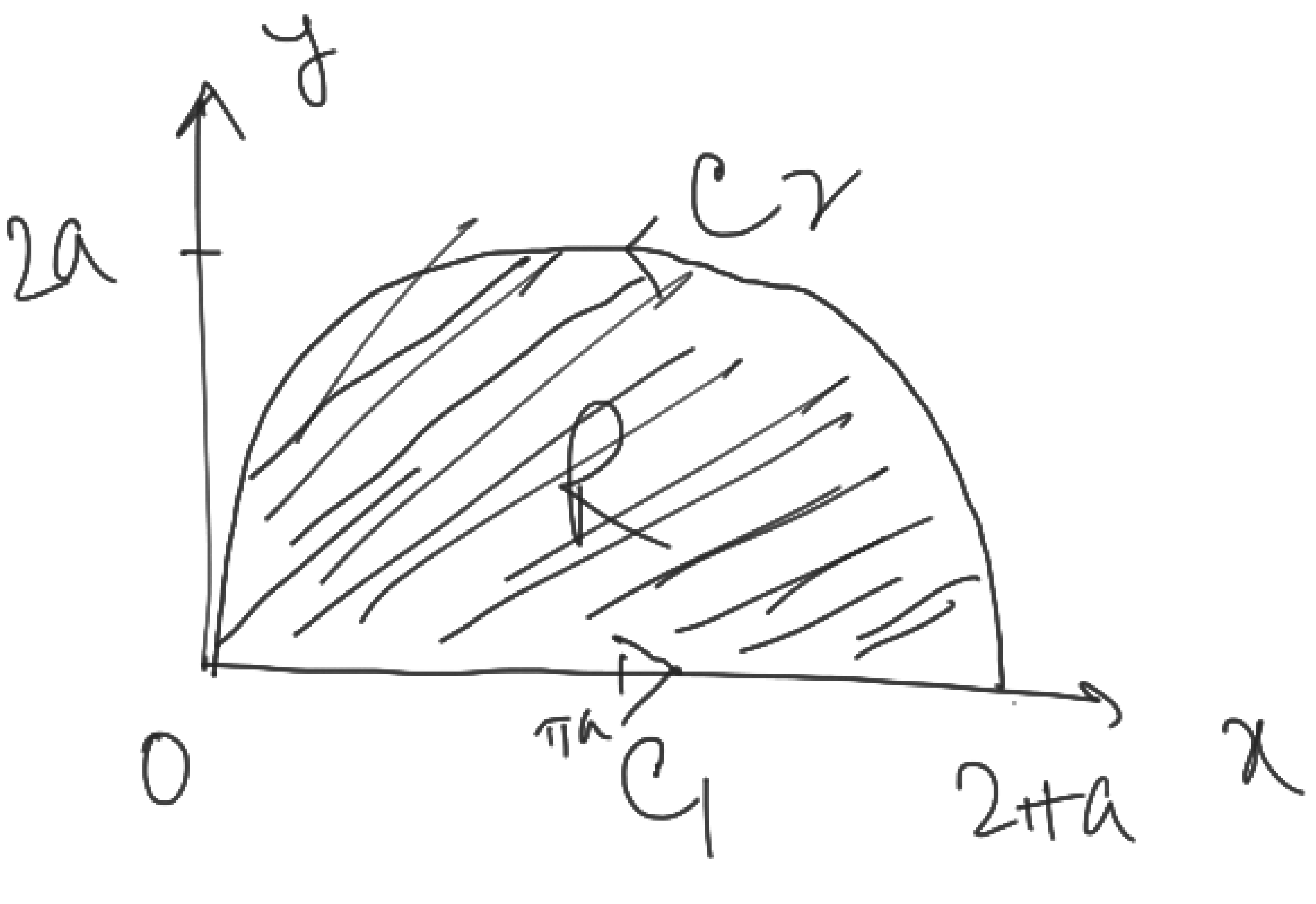
$f = xy \qquad \frac{\partial f}{\partial y} = x$

$g = x^2y^3 \qquad \frac{\partial g}{\partial x} = 2xy^3$

$\iint_R (2xy^3 - x)\,dx\,dy = ?$



Cycloid



$$\frac{\partial g}{\partial x} - \frac{\partial f}{\partial y} = 1$$

$$\iint_R dA = R$$

C_2:

$x = a(\theta - \sin\theta)$

$y = a(1 - \cos\theta)$

θ runs from 2π to 0.

$$\boxed{\vec{F} = -y\,i}$$

f

$I_{C_1} + I_{C_2}$

$y = 0,\ x = t,\ 0 \le t \le 2\pi a$

$$\int_{C_1} \vec{F} \cdot \vec{dr} = 0 .$$

$\frac{dy}{dt} = 0$

$$\int_{C_2} \vec{F} \cdot dr = \int (-y)\, dx = \int_{2\pi}^{0} -a^2 (1-\cos\theta)^2 \, d\theta$$

$$= a^2 \int_{0}^{2\pi} (1-\cos\theta)^2 \, d\theta$$

$dx = a(1-\cos\theta)\, d\theta$

dy, you don't need as j component is 0

$$= \underline{\underline{3\pi a^2}}$$