03. AC 2 Lec13
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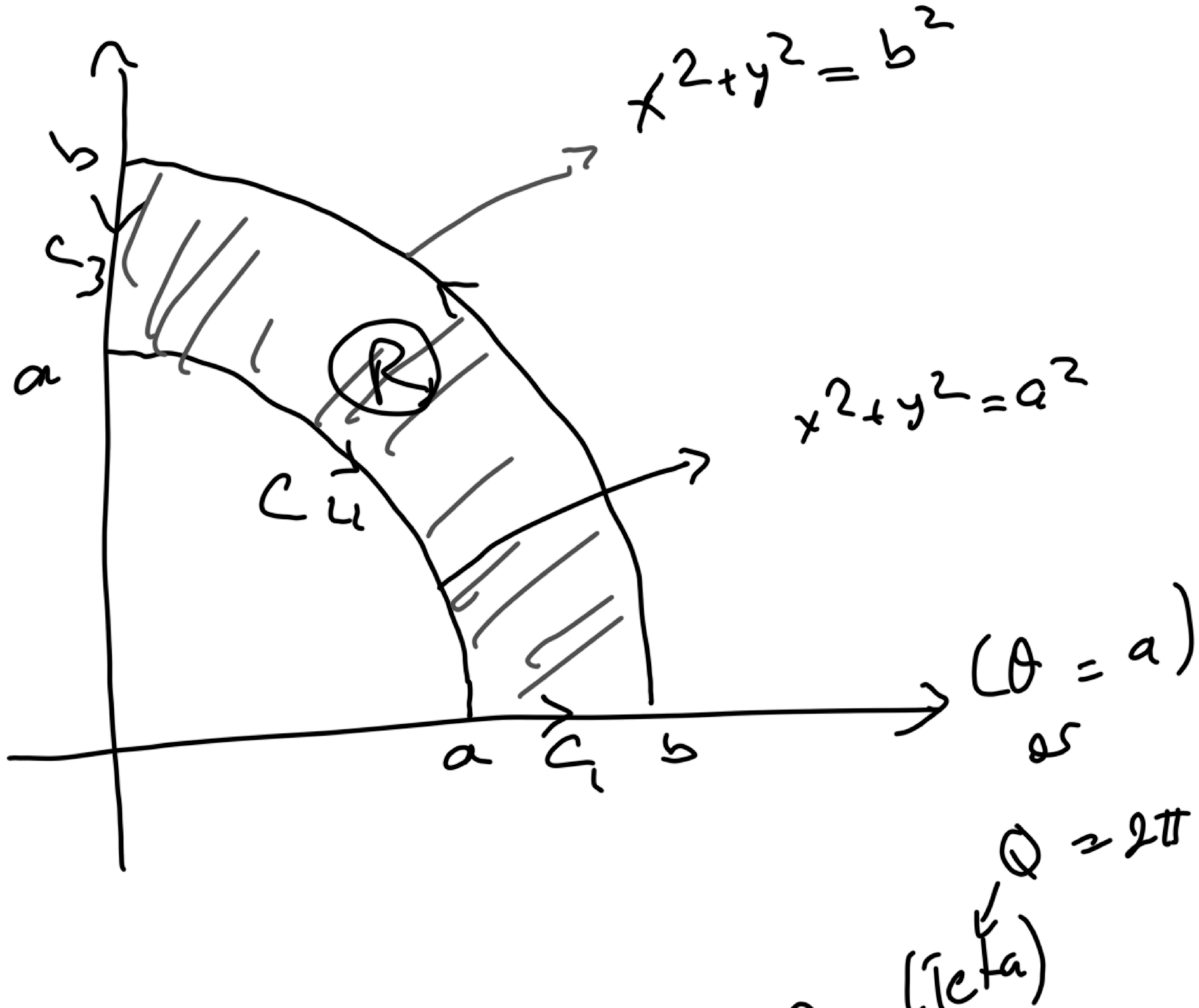
Remark: Green's Theorem is valid for regions that are not simply connected



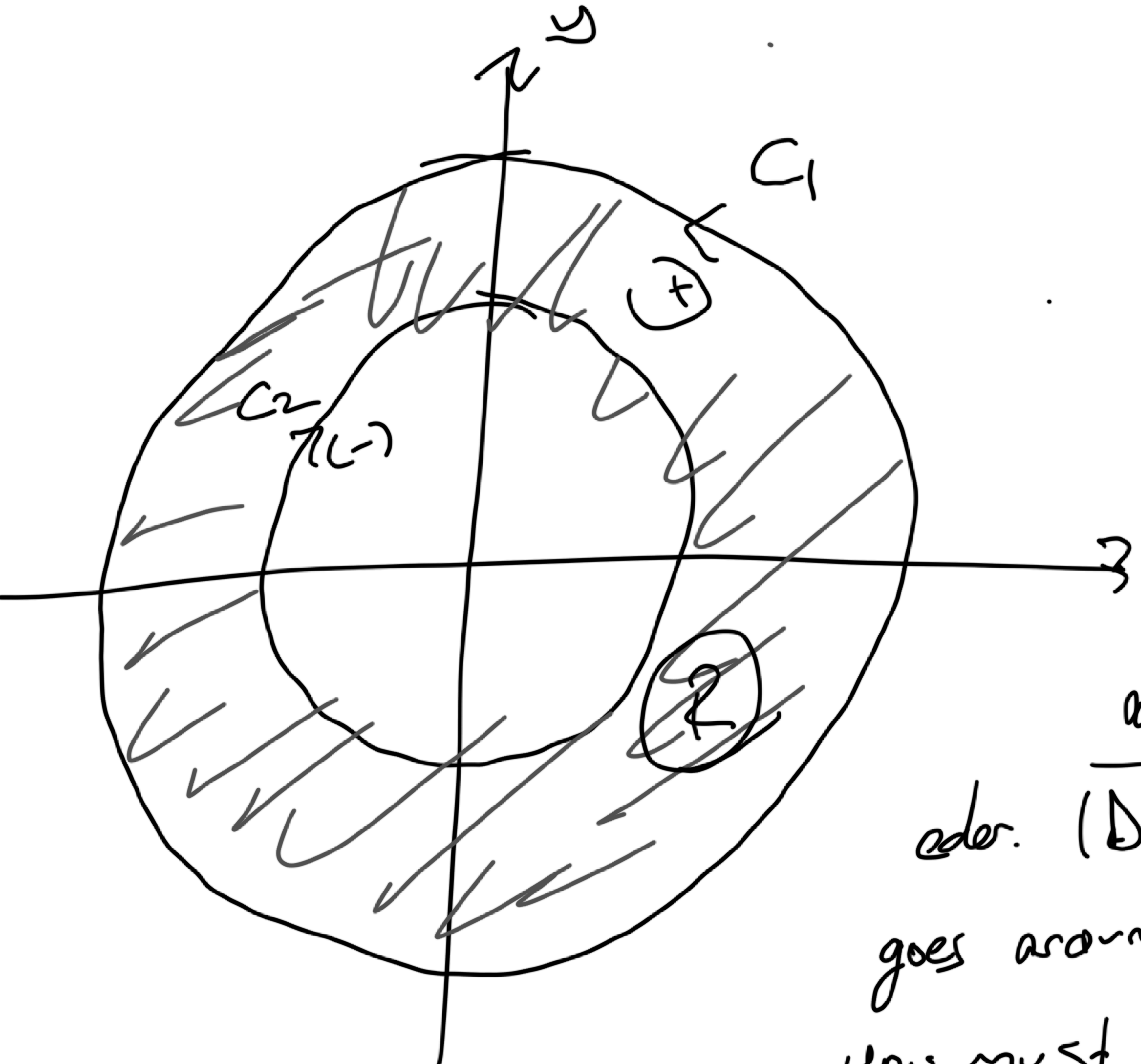
$C: C_1 \cup C_2 \cup C_3 \cup C_4$

$$\oint_C \vec{F}\, d\vec{r} = \oint_C P\,dx + Q\,dy = \iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) dx\,dy$$

(1) (2)

Green's Theorem in xy-plane

Note; Düzlem eğrisi olursa 2 şekilde yapılabilir.



$$\oint_{C_1} + \oint_{C_2} = \oint_{C}$$

<u>Note;</u> (+) (-) yonleri ifade eder. (Direction's is important. If you goes around the area your left, you must C_2 points going around left this area)

① $A = \frac{1}{2} \oint_C -y\,dx + x\,dy$; $\vec{F} = P\vec{i} + Q\vec{j}$ $\left\{ \begin{array}{l} P = -y \quad Q_x = 1 \\ Q = x \Rightarrow P_y = -1 \end{array} \right\}$

Area of region R

$Q_x - P_y = 1 - (-1) = 2$

(2) $A = \oint_C -y\,dx$; $\begin{cases} P = -y & P_y = -1 \\ Q = 0 & Q_x = 0 \end{cases} \Rightarrow Q_x - P_y = 0 - (-1) = 1$

$$\oint_C -y\,dx = \iint_R (1)\,dx\,dy = A$$

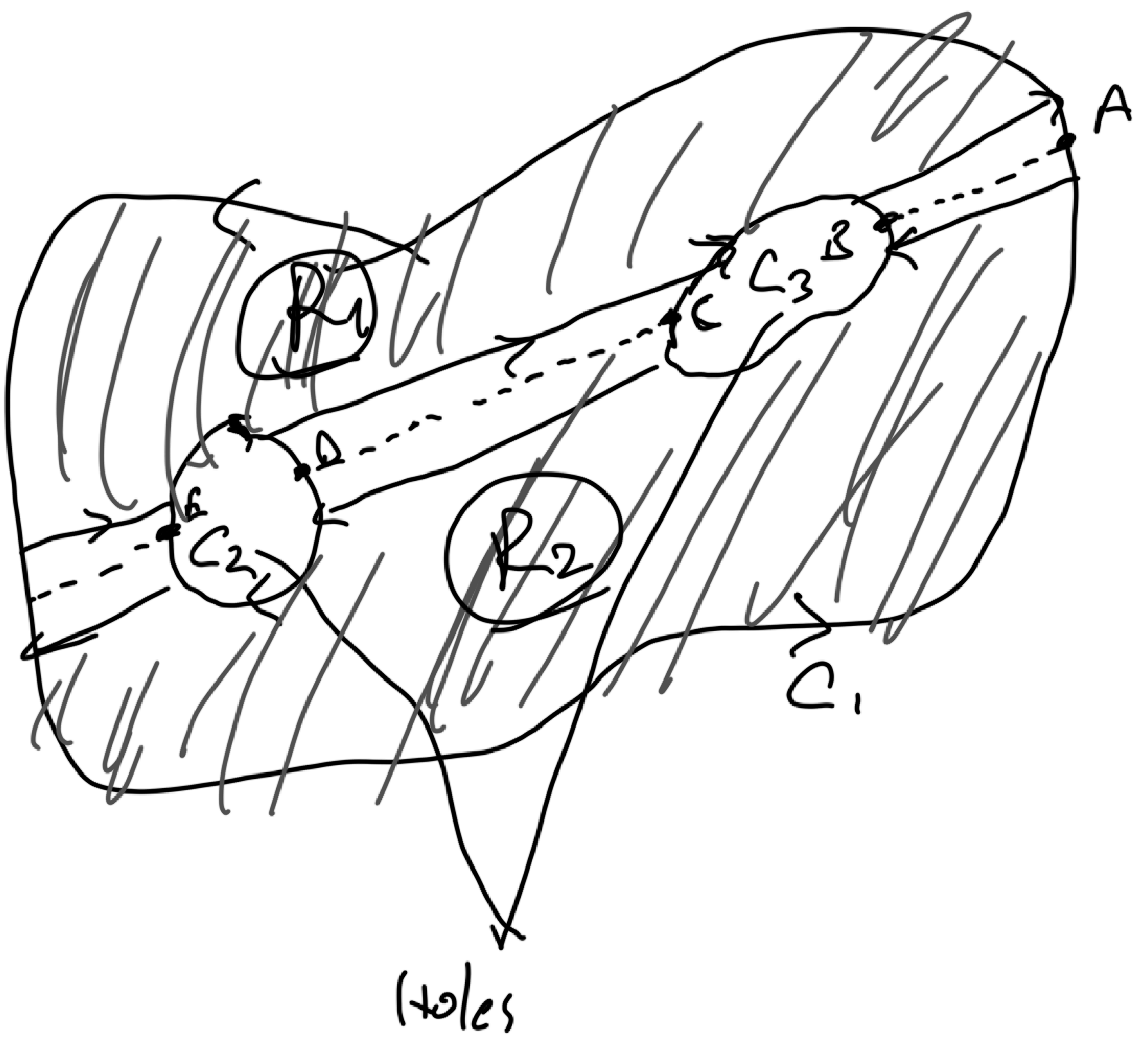
(3) $A = \oint_C x\,dy$; $\begin{cases} P = 0 & P_y = 0 \\ Q = x & Q_x = 1 \end{cases} Q_x - P_y = 1 - 0 = 1$

$$\oint_C x\,dy = \iint_R (1)\,dx\,dy = A$$

Remark: The curve is traversed counterclockwise and is said to be positively oriented if the region it encloses is always to the left of an object as it moves along the path. Otherwise, it is traversed clockwise and negatively oriented. The line integral of a vector field $\vec{F}$ along C reverses sign if we change the orientation.

Regions Many Holes

Green's Theorem holds for a region R with any finite number of holes as long as the bounding curves are smooth, simple and closed and we integrate over each component of the boundary in the direction that keeps R on our immediate left as we go along.



$R = R_1 \cup R_2$

$C = C_1 \cup C_2 \cup C_3$

Multiply Connected

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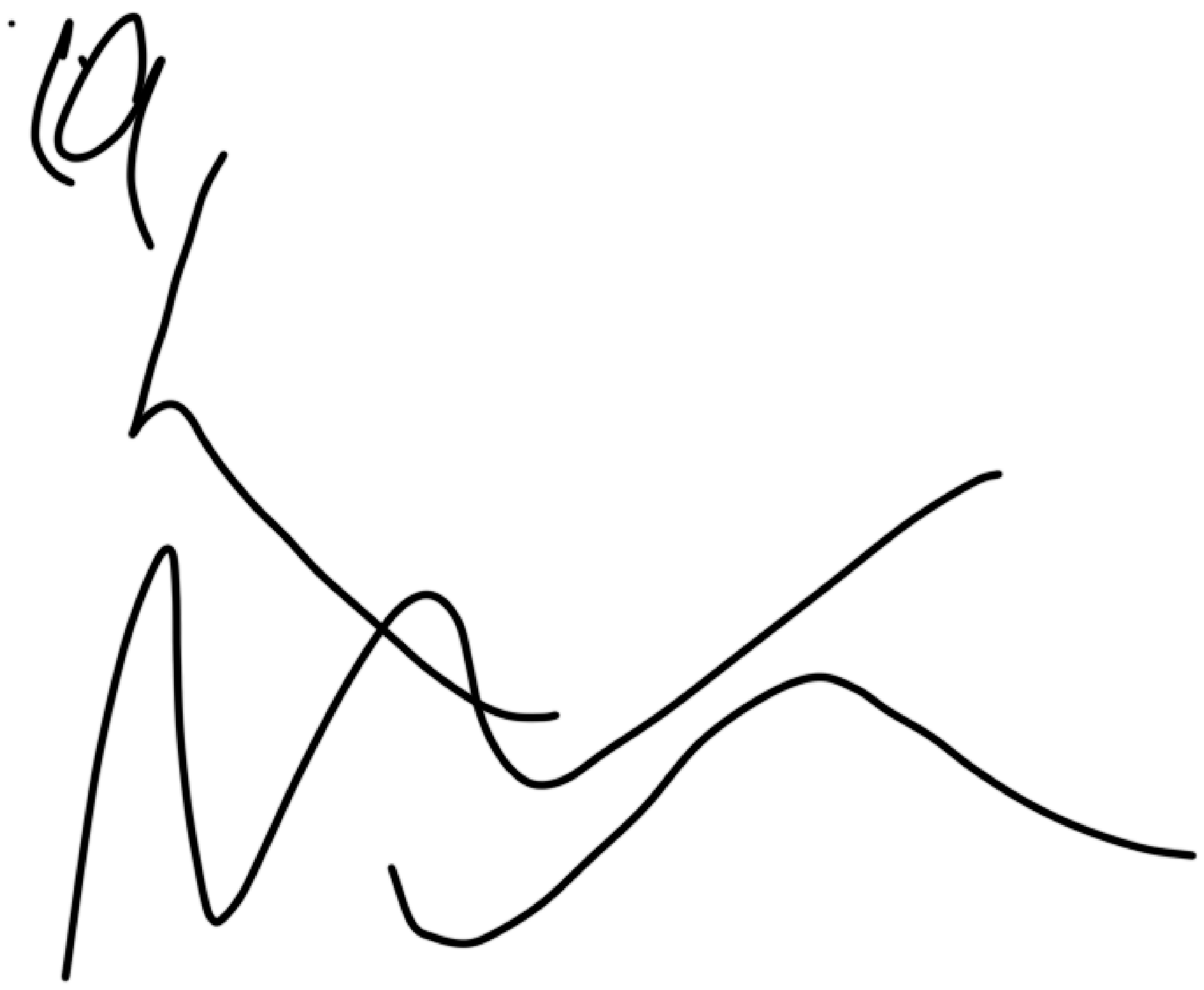
button rattles
backtalk



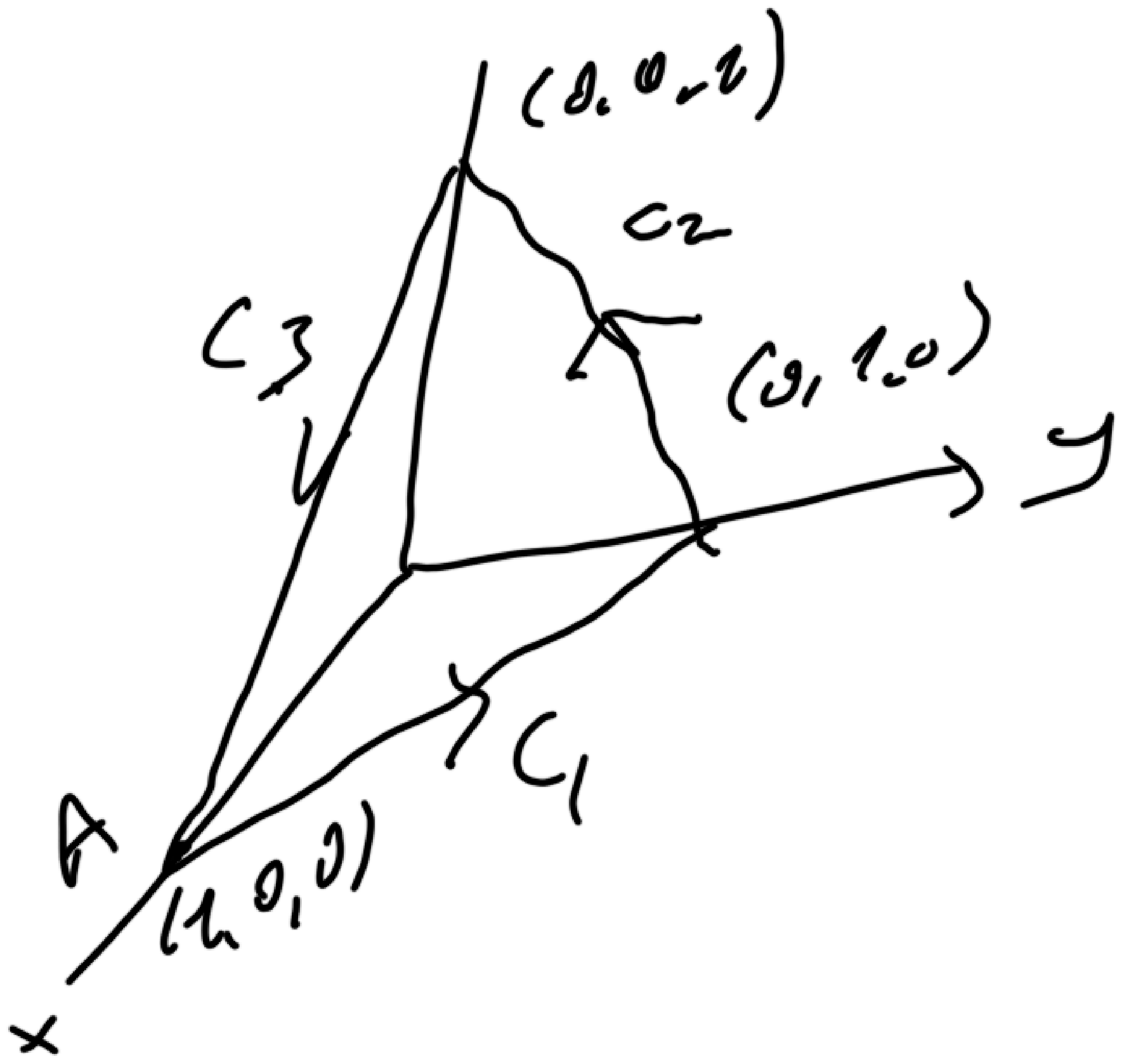
1 a şıkkı doğrudan hesaplayınız.

(b şıkkı grafiği kullanarak hesaplayınız.

Sanırım a şıkkı hatalı yazılmış

onu düzelt dedi

10. sorunun green theorem uygulanamaz.



$$\oint_C = \int_{C_1} + \int_{C_2} + \int_{C_3}$$

Green's theoremi geçersizdir.

düzlem eğrisi yoktur.