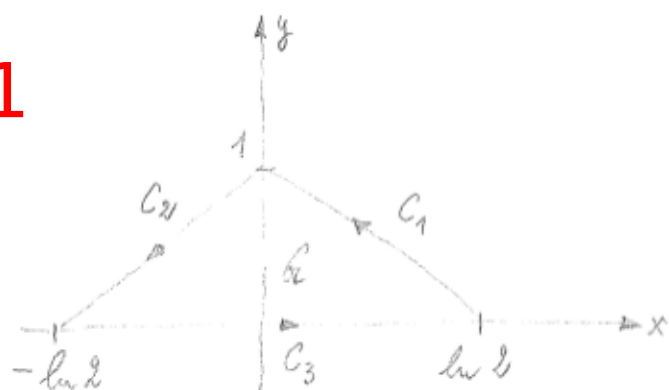| Aufgabe 2 | Ein Kurvenintegral (I) | **6 Punkte**

$$\int_{C_1+C_2} \left(e^x \cos y \, dx - e^x \sin y \, dy \right)$$

1

- Greenscher Satz:

$$\oint_{C_1+C_2+C_3} \left(e^x \cos y \, dx - e^x \sin y \, dy \right)$$

$$= \iint_G \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dx \, dy$$

1

(geschlossener Integrationsweg!)

hier: $P = e^x \cos y$ $\qquad Q = -e^x \sin y$

$\dfrac{\partial P}{\partial y} = -e^x \sin y$ $\qquad \dfrac{\partial Q}{\partial x} = -e^x \sin y$; Übereinstimmung,
Doppelintegral Null **1**

$$\boxed{\int_{C_1+C_2} \left(e^x \cos y \, dx - e^x \sin y \, dy \right) = -\int_{C_3} \left(e^x \cos y \, dx - e^x \sin y \, dy \right)}$$

$\textcircled{$C_3$}$ $\; y=0, \; dy=0, \quad (\cos 0 = 1)$

$\qquad -\ln 2 \le x \le \ln 2$ **1**

$$= -\int_{-\ln 2}^{\ln 2} e^x \, dx = -e^x \Big|_{-\ln 2}^{\ln 2} = -\left(e^{\ln 2} - e^{-\ln 2} \right)$$ **1**

$$= \frac{1}{e^{\ln 2}} - e^{\ln 2} = \frac{1}{2} - 2 = \boxed{-\frac{3}{2}}$$ **1**