Oef 4 (e)

$$\int_0^1 \frac{x^3}{x^2+x-2}\,dx$$

↳ $(x-1)(x+2)$

1. oneigenl?

$x=0$ $\lim_{x\to 0^>} \frac{x^2}{x^2+x-2} = 0$ Neen

$x=1$ $\lim_{x\to 1^<} \frac{x^2}{x^2+x-2} = \infty \Rightarrow$ oneigenl. in bovengrens

$$I = \lim_{t\to 1^<} \int_0^t \frac{x^3}{x^2+x-2}\,dx$$

Onbep int.: $\int \frac{x^3}{x^2+x-2}\,dx$

Stt 1

$$\begin{array}{r|l} x^3 & x^2+x-2 \\ \hline -(x^3+x^2-2x) & x-1 \\ \hline -x^2+2x & \\ -(-x^2-x+2) & \\ \hline 3x-2 & \end{array}$$

$$= \int \left(x-1+\frac{3x-2}{x^2+x-2}\right)dx$$

$$= \frac{x^2}{2} - x + \int \left(\frac{A}{x-1}+\frac{B}{x+2}\right)dx$$

$A(x+2)+B(x-1) = 3x-2$

$$\begin{cases} A+B=3 & |1| \\ 2A-B=-2 & |1| \end{cases} \begin{array}{l|l} 2 & \\ -1 & \end{array} \begin{cases} 3A=1 \\ 3B=8 \end{cases} \Leftrightarrow \begin{array}{l} A=\frac{1}{3} \\ B=\frac{8}{3} \end{array}$$

$$= \frac{x^2}{2} - x + \frac{1}{3}\int \frac{dx}{x-1} + \frac{8}{3}\int \frac{dx}{x+2}$$

$$= \frac{x^2}{2} - x + \frac{1}{3}\ln|x-1| + \frac{8}{3}\ln|x+2|$$

$$I = \lim_{t \to 1^-} \int_0^t \frac{x^3}{x^2+x-2}\,dx$$

$$= \lim_{t \to 1^-} \left[\frac{t^2}{2} - t + \frac{1}{3}\ln|t-1| + \frac{8}{3}\ln|t+2| - \left(0 + 0 + \frac{1}{3}\ln 1 + \frac{8}{3}\ln 2\right)\right]$$

$$= \frac{1}{2} - 1 - \infty + \frac{8}{3}\ln 3 - \frac{8}{3}\ln 2$$

$$= -\infty \Rightarrow \text{divergent}$$