

# rechnung\_umkehrintegrator

## Student Group

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$U_A = f(U_E)$	with III.	
$\frac{d}{dt} U_A = \frac{d}{dt} f(U_E)$		
$U_A = \frac{1}{C} \int I_C dt - U_C$	with II. and I.	$U_D = \frac{1}{A} \int U_A dt \rightarrow \infty \rightarrow 0$
$\frac{d}{dt} U_A = \frac{d}{dt} 0 - \frac{1}{C} \frac{d}{dt} U_C$	with V.	$U_C = \frac{1}{C} \int I_C dt + Q_0(t_0)$
$\frac{d}{dt} U_A = \frac{1}{C} \int I_C dt + Q_0(t_0)$	with IV.	$I_C = I_R$
$U_A = \frac{1}{C} \int I_C dt + Q_0(t_0)$	Factor out	
$U_A = -\frac{1}{C} \int I_C dt - \frac{Q_0(t_0)}{C}$	consider the integration constant	$\frac{Q_0(t_0)}{C} = U_C(t_0) = -U_{A0}$
$U_A = -\frac{1}{C} \int I_C dt + U_{A0}$	with VI. and II.	$I_R = U_R = U_E$
$U_A = -\frac{1}{C} \int U_E dt + U_{A0}$	move constant ahead	
$U_A = -\frac{1}{R} \int U_E dt + U_{A0}$	insert time constant $\tau = R \cdot C$	
$U_A = -\frac{1}{\tau} \int U_E dt + U_{A0}$		

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