

# rechnung\_umkehrintegrator

## Student Group

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

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