

rechnung_umkehrintegrator

Student Group

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\$\vdots\$	\$U_A = f(U_E)\$
\$\vdots\$	with III.
\$\vdots\$	
	$U_A = \frac{1}{C} \int_0^t I_C dt + Q_0(t_0)$
	with II. and I.: $U_A = \frac{1}{C} \int_0^t I_C dt + Q_0(t_0)$
	$U_A = \frac{1}{C} \int_0^t I_C dt + Q_0(t_0)$
	with IV.: $I_C = I_R$
	$U_A = -\frac{1}{C} \int_0^t I_R dt + Q_0(t_0)$
	Factor out
	$U_A = -\frac{1}{C} \int_0^t I_R dt + Q_0(t_0)$
	consider the integration constant: $Q_0(t_0) = U_C(t_0) = -U_{A0}$
	$U_A = -\frac{1}{C} \int_0^t I_R dt + U_{A0}$
	with VI. and II.: $I_R = \frac{U_R}{R} = \frac{U_E}{R}$
	$U_A = -\frac{1}{C} \int_0^t \frac{U_E}{R} dt + U_{A0}$
	move constant ahead
	$U_A = -\frac{1}{R \cdot C} \int_0^t U_E dt + U_{A0}$
	insert time constant $\tau = R \cdot C$
	$U_A = -\frac{1}{\tau} \int_0^t U_E dt + U_{A0}$

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