

# rechnung\_umkehrintegrator

## Student Group

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|------------|---------|--------------|
|            |         |              |
|            |         |              |
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## Table of Contents

|                                                                                      |                                                                           |  |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--|
| $U_A = f(U_E)$                                                                       |                                                                           |  |
| with III.                                                                            |                                                                           |  |
| $U_A = \textcolor{blue}{-U_D} - U_C$                                                 |                                                                           |  |
| with II. and I.                                                                      | $\textcolor{blue}{U_D} = \frac{1}{A_D} \cdot U_A \xrightarrow{\infty} 0$  |  |
| $U_A = 0 - \textcolor{blue}{U_C}$                                                    |                                                                           |  |
| with V.                                                                              | $\textcolor{blue}{U_C} = \frac{1}{C} \cdot \int_0^1 I_C \, dt + Q_0(t_0)$ |  |
| $U_A = -\frac{1}{C} \cdot \int_0^1 I_C \, dt + Q_0(t_0)$                             |                                                                           |  |
| with IV.                                                                             | $\textcolor{blue}{I_C} = I_R$                                             |  |
| $U_A = \textcolor{blue}{-\frac{1}{C} \cdot \int_0^1 I_R \, dt + Q_0(t_0)}$           |                                                                           |  |
| Factor out                                                                           |                                                                           |  |
| $U_A = -\frac{1}{C} \cdot \int_0^1 I_R \, dt - \textcolor{blue}{\frac{Q_0(t_0)}{C}}$ |                                                                           |  |
| consider the integration constant                                                    | $\textcolor{blue}{\frac{Q_0(t_0)}{C}} = U_C(t_0) = -U_{A0}$               |  |
| $U_A = -\frac{1}{C} \cdot \int_0^1 I_R \, dt + U_{A0}$                               |                                                                           |  |
| with VI. and II.                                                                     | $\textcolor{blue}{I_R} = \frac{U_R}{R} = \frac{U_E}{R}$                   |  |
| $U_A = -\frac{1}{C} \cdot \int_0^1 \frac{U_E}{R} \, dt + U_{A0}$                     |                                                                           |  |
| move constant ahead                                                                  |                                                                           |  |
| $U_A = -\frac{1}{R} \cdot \int_0^1 U_E \, dt + U_{A0}$                               |                                                                           |  |
| insert time constant                                                                 |                                                                           |  |
| $\tau = R \cdot C$                                                                   |                                                                           |  |
| $U_A = -\frac{1}{\tau} \cdot \int_0^1 U_E \, dt + U_{A0}$                            |                                                                           |  |

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